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Contents:

	PAGE
Contractors and Rural Areas	1
The British Industries Fair, 1930	2
The Load Factor of Distribution Losses	2
The E.C.A. Convention.—I *(illus.)*	3
The Electrical Industry and the Public, by A. G. Bruty	5
Contractors and Rural Electrification, by H. R. Taunton	11
The I.E.E. in France.—III, by R. B. Matthews *(illus.)*	13
The E.H.P. Conference at Paris, by R. B. Matthews	16
Do You Know?	17
Intermittent Illumination in Industry	18
Business and Industrial Notes	19
Lighting and Power Notes	22
Tramway and Railway Notes	23
Telegraph and Telephone Notes	24
Radio Notes	25
Contract Information	25
Forthcoming Events	26
Notes	26
Institution Notes	29
Our Personal Column	30
Financial Section—	
New Companies Registered	31
Official Returns of Electrical Companies	31
City Notes	32
Stocks and Shares	33
Australian Imports and Exports	35
Foreign Trade Inquiries	36
The Cockle Creek Power Station *(illus.)*	37
North-East England Electricity Scheme *(illus.)*	38
Applications of A.C. to Electro-deposition	39
Overhead Lines in India *(illus.)*	40
Reviews	41
Arranging Window Displays, by W. A. G. Martin	42
New Electrical Devices, Fittings, and Plant *(illus.)*	44
Legal	45
Correspondence—	
Whiteleyism	45
National Co-operative Research	46
Overhead Lines	46
The Price of Brains	46
Lady Demonstrators	47
Published Specifications	47
Trade Mark Applications	47
New Work for Contractors	48

Contractors and Rural Areas.

IT is now nearly four years since a Committee of the Institution of Electrical Engineers reported on the use of electricity in agriculture. Much progress has been made in rural electrification since 1925 through the agency of progressive undertakings which have extended their distribution systems outwards from urban nuclei.

The revenue from the prior town supplies has thus provided development charges and insurance against commercial failure. In Lincolnshire, however, where it is proposed to supply a large area devoid of large towns and heavy industries, such a nucleus can hardly be said to exist, and the inference is that the commercial prospects of rural electrification are now such that urban support can be dispensed with, provided a bulk supply is available to free the undertaking from the necessity of meeting standing charges on generating plant in the unremunerative early stages. As a further sign of the times, the Ministry of Transport has indicated, in the practical manner related in our issue of May 31st, pp. 948 and 986, its will to justify the hopes raised in the minds of the country population during the passage of the 1926 Act.

Those who believed in the future of electricity supply in what were for long regarded as commercially unattractive districts have in the past been able to refute the difficulties imagined by pessimists. Events have proved that, broadly speaking, they were right; but the time has now come when the real difficulties must be recognised. A perusal of the paper read by Mr. H. R. Taunton before the E.C.A. Conference at Bournemouth can be recommended, since the author frankly faces the facts as they appear to a contractor. An abstract of the paper is presented elsewhere in this issue.

The first obstacle referred to by the author is the innate conservatism of the British farmer, a conservatism that is confirmed by a pessimistic habit of mind, which for some years past has, unfortunately, borne some relation to the facts of his existence. It is useless, therefore, to expect him to take the initiative. To persuade him to use electric light should not be difficult; but the farmer keeps early hours and lighting of itself would rarely provide a paying load. Adding the electrical energy required in barn and dairy and for cooking, the annual consumption on the average 150-acre farm would exceed 3,000 kilowatt-hours, more than ten times that for light-

ing only and three times the present average. Ploughing, threshing, &c., would provide a very much larger load, it is true; but undertakings will not be willing to lock up their capital until the possibly distant date when these uses of electricity become common. The tendency of the supply authorities will, no doubt, be to concentrate initial efforts on the larger farms and the villages, especially poultry and dairy farms and those villages in which rustic industries provide immediate consumers.

Whoever desires to secure the custom of the farmer must know not only how to bring electricity to him, but also how to apply it to every use on the holding. He must be able to answer the query as to how an existing oil-engine may be disposed of without loss. He must also be able to place a complete scheme before the farmer, thus relieving him of the responsibility of co-ordinating the purchase of the various pieces of apparatus required, and in addition be able to give service after purchase. The advantage of an electrical drive for labour saving, by the way, makes little appeal to the farmer, who argues that he cannot dispense with a fraction of a man, whose services would be necessary for other operations.

With regard to propaganda, Mr. Taunton advises, in addition to the sending out of appropriate pamphlets, the use of suitable stands at agricultural shows and of lorries, equipped with portable motors, which could be run to any farm, where the motors would be coupled to various machines to show how the work could be performed electrically and at what cost. The most efficient propaganda, however, will fail of its purpose unless a promise can be made to the farmer that he will be able to secure what he requires by paying for it by instalments.

There remains one other point of the greatest importance, and that is the especial need for first-class material and workmanship in farm installations. While there is a good case for modifying regulations as regards overhead distributors in country districts, there is none as regards consumers' wiring. Much of the latter will be in situations where it is more than usually liable to deterioration, while a fatality, or even a severe shock, would have pronounced effects in staying progress in the locality in which it occurred.

Pertinent to this subject is the appeal to supply authorities to press for adequate powers for refusing connection to unsafe installations, made by Mr. A. C. Bruty in his Conference paper on "the mutual responsibility of contractors, manufacturers and supply undertakings," which is also abstracted in this issue. Mr. Bruty also calls attention to the desirability of relaxing rules regarding the starting of squirrel-cage motors; this is particularly the case in the country, where unvarying voltage, to which we have become accustomed in large towns, is unnecessary.

It is, we think, obvious that the funds for propaganda, financing hire-purchase schemes, and providing a trained negotiating staff can only be provided by some body with resources of a magnitude far beyond those of the ordinary contractor. Mr. Taunton calls on the Electrical Contractors' Association to assume the responsibility. There is a great deal in favour of this course, if only in the interests of constituent members. If the Association, or some substantial authority representing the contractors' interests, cannot see its way to undertake the task, then—we agree with Mr. Taunton's contention—the duty will devolve on supply authorities, with or without the assistance of the contractors.

The British Industries Fair, 1930.

MEMBERS of the electrical and allied trade interested in that part of the British Industries Fair which is to be held in London in the reconstructed Olympia in February, 1930, would do well to take notice very definitely that during next year's Fair there, owing to the restricted area, there will not be room for everybody who applies. The first chance has therefore been given to manufacturers who were exhibitors in 1927, 1928, or 1929. Applications for such space, let us state, can only be guaranteed to such firms whose forms are received by July 21st. By the February of 1931, further building work at Olympia will have added much more space.

With regard to the Castle Bromwich section and the desire which has been expressed by some electrical firms to remain at Birmingham in February in later years, and by others to change the date over to later in the year, early May and September both having merits of their own, we have emphasised the fact again and again that the electrical trade does not run the Exhibition either in Birmingham or London, and it must abide by the majority decision of all classes and by the guidance that is thus given to the authorities. In case any readers of the ELECTRICAL REVIEW have gathered from any other source that a change of the date of the Fair for 1931 has already been resolved upon, we wish to state on the highest possible authority that the question of the date at which the Fair shall be held has been under discussion with the exhibitors for many years past, and will certainly be discussed again in connection with future Fairs. "Opinion has, however, been divided on the subject, and up to the present there has not been a majority amongst the exhibitors in favour of making a change." All that remains absolutely definite at the present moment is that electrical firms should resolve immediately that in 1930 they will co-operate in the Fair at Castle Bromwich in the most business-like manner so far followed, and that they will use every legitimate means, not of course excluding the means of the ELECTRICAL REVIEW, of letting their foreign friends and other readers know what they can see in February if they come.

The Load Factor of Distribution Losses.

ON account of the irregular shape of the usual system load curve, some care must be exercised in calculating the annual distribution losses for any given undertaking. Iron losses for transformers, being independent of the output, may easily be assessed, and their load factor is 100 per cent. during the period that the transformers are in commission.

The load factor of copper losses, on the other hand, varies as the ratio of the average of the square of the load during the year to the square of the maximum load. Its relation to any system load factor may be plotted as a curve whose points lie between those of two other curves. The upper curve represents a condition in which there is a constant demand for a portion of the year and a zero demand for the remainder; in this case the load factors of the copper losses and of the system are identical. The lower curve is due to a condition in which a peak of infinitesimally short duration succeeds and is followed by a constant demand of relatively low value; in this case the load factor of the copper losses is approximately equal to the square of the load factor of the system.

From calculations based upon an examination of a large number of representative load curves it would appear that; for any undertaking having a load curve corresponding to that of normal undertakings at an equivalent system load factor, the load factor of the copper losses may be assumed to be equal to the sum of the system load factor squared multiplied by 0.7 and the system load factor multiplied by 0.3.

Iron losses must be calculated separately and added to the copper losses to obtain total distribution losses.

It should be borne in mind that the empirical formula given above refers only to losses in the distribution system as a whole. In order to ascertain the load factor of the losses in any given section of the network, it will be necessary to take into account the load factor appertaining to the supply given from the section. It might in some cases be necessary to correct the formula to allow for a nearer approach to the upper or lower hypothetical curves, if the shape of the load curve for the section departed appreciably from the normal.

The E.C.A. Convention.—II.

An Account of the Proceedings at Bournemouth.

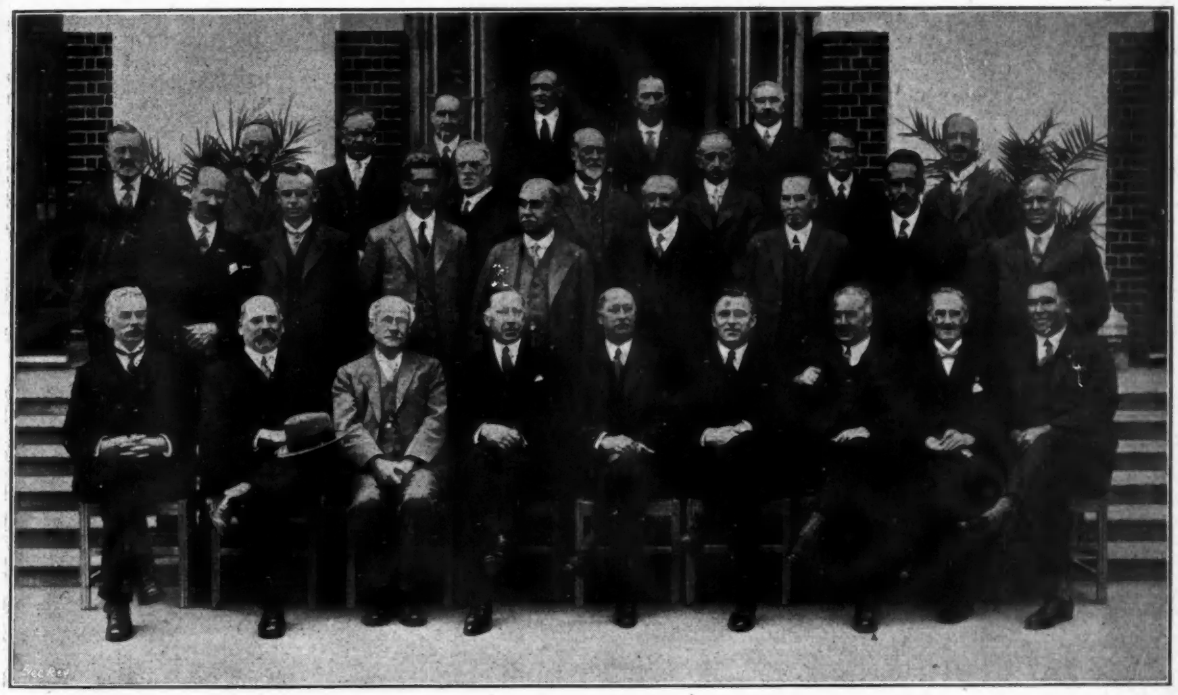
THE organisation of conferences is a matter requiring a great deal of foresight and experience, and although this year's conference of the E.C.A. Allied Associations was only the fourth, it demonstrated that those responsible for these conferences are fully acquainted with the work. Everything proceeded according to plan—except the taking of the official photograph, which was postponed by no fault of the organisers—and the weather proved excellent. The last factor has rather marred previous conferences—especially that at Scarborough. As we said last week, the attendance (450) was a record one, and it appeared that the number of ladies participating was greater than ever before. This added considerably to the success of the dance which followed the President's reception on the opening day and to that of the ball with which the proceedings concluded.

There was a good attendance at the opening meeting (June 27th), when the delegates received a civic welcome from the Mayor of Bournemouth.

On behalf of the Town Council and residents the Mayor said he desired to emphasise in every possible way the very great importance they attached to the work of the Association. In Bournemouth they were confronted with problems in connection with the supply of electricity, and they were looking forward with great interest to the scheme which the Electricity Commissioners were going to propound for that district. Great changes would follow in the rural areas, and especially in the small congeries of towns such as they found around Bournemouth—changes which, he hoped, would be for the better. Members of the Electrical Contractors' Association would be called upon to play a very great part in those developments, and the country would look forward to their co-operation and advice in the areas concerned. He was sure that the results of the conference would be to the delegates' benefit, and ultimately to the advantage of their clients the consumers.

Thanking the Mayor for his warm welcome, the President said he was confident that both from the business and social standpoints the conference would achieve a very high standard of excellence.

Mr. Walton's presidential address was well received. After the morning session the members were given copies of the booklet to which Mr. Walton referred—"Electrical Security: Installation Work, Good and Bad." This excellent little production (which is dealt with more fully in our "Business Notes") was unanimously accepted as a valuable contribution to the attainment of the aims of the E.C.A. and the National Register.

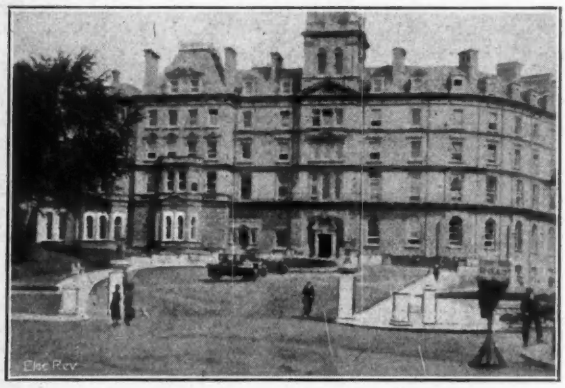


The Council of the E.C.A. Allied Associations, Bournemouth, 1929.

In the afternoon Mr. Bruty read his paper, abstracted in this issue, which raised a lengthy discussion which had to be cut short owing to lack of time. This was contributed to equally by contractors and manufacturers—the two parties with which Mr. Bruty's paper dealt. Mr. W. R. Rawlings considered that the paper would do much to bring the two sections together, and he again put forward the suggestion of a combination to include all sections of the industry. He twitted the E.L.M.A. and C.M.A. upon their wealth, contrasting them with the poverty-stricken contractor. Mr. H. H. Berry, after assuming that as the wholesaler was not specifically mentioned, he was bracketed with the manufacturer, put forward a recent proposal by Dr. Ferranti that there should be a uniform tariff throughout the country, with the fixed charge varying according to local conditions. Another proposal was that a joint committee of E.D.A. and B.E.A.M.A. should study the means of rendering service to the consumer and providing appliances at the lowest possible prices.

Mr. Hazel thought that E.D.A., by reason of its im-

partiality and representative character, was the best body to secure the desired co-operation. He also said that the manufacturers would benefit very considerably by consulting the contractors, who were in immediate touch with the public's requirements. Mr. Grierson touched upon the difficult attitude of some supply authorities, and quoted a case which he had actually experienced. Topically he brought in the subject of "yardsticks," and maintained that the success of a supply



The Town Hall, Bournemouth.

undertaking should be measured, not by its financial results, but by the *per capita* consumption of the population. Mr. H. W. Roberts thought that the craving for cheapness which had characterised the industry in the past was giving place to a realisation of the advantages of quality and service. He said that if contractors wanted to make money they would have to pay more attention to the counter trade. Mr. Ll. B. Atkinson gave the C.M.A. version of the transactions with the Irish Electricity Supply Board mentioned by Mr. Bruty. He attributed the trouble, broadly, to the inability of the contractors to come to terms with the Board. Mr. Rawlings's views upon the wealth of lamp and cable manufacturers were neatly countered by Mr. C. W. Sully (E.L.M.A.) in a manner which was thoroughly appreciated by the delegates. Mr. Sully said that E.L.M.A. had always looked on the contractor as the key to the retail trade, and it looked forward to the time when he would be the only distributor of Association lamps. His remarks on lighting were aptly illustrated by a comparison of the rather primitive arrangements of the conference hall with the up-to-date installation at the new Pavilion. Mr. Bruty, in the course of his reply, maintained, in spite of Mr. Atkinson's explanation, that the Irish contractors had been deprived of their main argument: that they supplied British cables because they bore a guarantee of quality. He said that the Irish contractors were in a most precarious position; they did not know when they would have to close up altogether. In the evening a smoking concert took place in the Pavilion.

On the morning of Friday, June 28th, Mr. H. R. Taunton read his paper on "The Contractors' Part in Rural Electrification."

As will be seen from the abstract which follows, the author pointed to the necessity for the contractors to do their best to secure the rural business or be prepared to see the work done by others. He stressed the necessity for some method of financing the purchase of installations and appliances and suggested means by which the E.C.A. might assist its rural members to do their part.

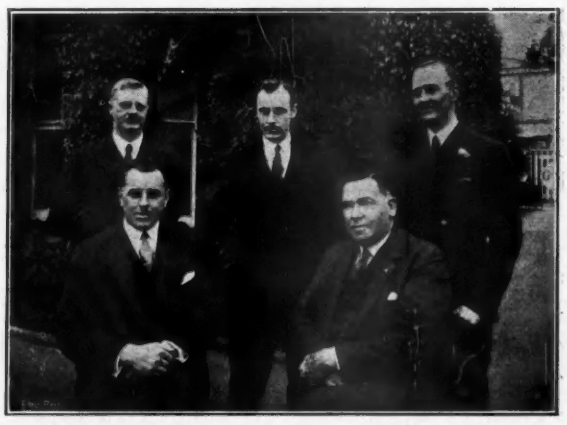
The discussion which ensued kept to the high standard set by the opening speaker, Mr. Walter Riggs. This gentleman pointed out that the keynote of the agricultural industry was "Cash on delivery," and he considered that the farmer, once convinced of the benefits, would prefer to pay on the nail for installations and appliances. He agreed that it would be difficult to persuade him that an electric motor was better than his existing oil engine. Contrary to the accepted idea, the farmer was not an unbusinesslike individual and he was as keen as anyone upon business efficiency. He cheered his audience by saying that in any event they had not to meet the competition of gas in the villages.

Mr. W. J. Furse, who claimed to be a hundred per cent. rural, feared that if the Association was not careful it would merely sow to enable the "kerbstoner" to reap. This speaker recounted a most interesting story of electrification in a village which secured the support of the squire, who, although a baronet, differed considerably from the melodramatic type in that he sought his people's good.

Mr. H. T. Young was convinced of the author's thorough grasp of the subject; it bristled with difficult points and Mr. Taunton had omitted them. *Festina lente* was as much a rural as an urban policy. They had to get the lighting in first and the rest would follow in due course. He suggested that open-eyed contractors, like the three blind mice, should run after the farmer's wife and get *her* to persuade the farmer into installing electricity.

So far what might be, and ought to be, had held the field, when Mr. E. A. Reynolds mentioned what had already been done on a large scale. Readers of the ELECTRICAL REVIEW are already aware of the important work which the S. W. & S. Power Co. has carried out in its rural areas, and the position was admirably summarised by Mr. Reynolds. An impressive point which emerged from his contribution was that the cost of h.p. tappings was less than half that suggested by Mr. Taunton. The S.W.S. Co. already has a travelling exhibition and has organised quite a number of exhibitions in small towns and villages. In all its work it has had the co-operation of the contractors by means of a unique form of E.D.A. Circle. Another point in Mr. Reynolds's remarks was his statement that the company was equipping an experimental farm in which many applications of electricity direct and indirect would be tested.

Mr. Atkinson dealt mainly with the financial side of the question and indicated that there were already concerns which could help the contractors in the hire-purchase of appliances. He thought that the financing of the actual installation work should be in the hands of the supply authorities who could cut off the current if instalments were not duly met. He promised an early



Standing:—Mr. S. T. Meggitt, Mr. H. H. Shears (secretary, Bournemouth Branch), and Mr. H. S. Rogers (chairman, Bournemouth Branch).
Seated:—Mr. A. R. Wilson (local conference secretary) and Mr. N. Aish (chairman of the committee).

The Local Conference Committee.

report from the Electricity Commissioners' Committee, which is dealing with the matter and of which he is a member.

Mr. Taunton, in his reply, agreed that the S.W.S. Co. had done great work and had co-operated with the contractors. But it might not work out like that in other parts of the country. The contractors would have to be on their guard against the supply authorities doing all the work on their own.

On the motion of the President, thanks were accorded to the Mayor and Corporation of Bournemouth, to the readers of the papers, the Conference stewards and the local branch of the E.C.A., and to the Cunard Company, which had permitted the delegates to go over the s.s. *Aquitania* at Southampton docks.

Installing Mr. H. Willoughby-Ellis as the new president, Mr. Walton spoke of the services rendered by him during his two years as chairman of the Southern Section, and as vice-president during the past year.

Mr. WILLOUGHBY-ELLIS, after an appreciation of Mr. Walton, said that he was confident of the full support of his vice-president, Mr. Hazel, who had worked zealously in the north. He believed thoroughly in the importance of the continuity of policy. He mentioned particularly development, trading matters, and co-operation with supply authorities. He had been particularly gratified during the past year at the efforts designed to raise the status of electrical contractors in the eyes of the allied professions and of the general public. The results achieved in their trading negotiations during the past year needed following up and developing. The improved relations between supply companies and electrical installation engineers must be cemented by every means in their power. It was no part of his policy, or his disposition, to be satisfied with things as they were. He was discontented with the trading abuses and the injustices with which they were confronted, and he would spare no effort to support the Trading Committee in its activities. They might feel that progress was slow and that evasions of their fair-trading policy were many, but they must remember that more was obtained by patient diplomacy than by force, and that there was such an implement as the boomerang. A national trading register was essential to their future welfare, but it was bound to occupy a lot of time in its preparation. In the meantime, in dealing with all transgressions of fair-trading principles, they were entitled to employ their buying power to the best possible effect.

Mr. W. RIGGS proposed a vote of thanks to the past-president, and mentioned that Mr. Walton had been appointed as one of their representatives on the committee to administer Clause 48 of the Electricity Act. Mr. WILLOUGHBY-ELLIS seconded, and the vote was carried with acclamation. This concluded the business of the Conference, and the delegates then proceeded to the gardens for the taking of the official photograph.

The trip to Southampton in the afternoon attracted a large body of delegates, and the Mayor's ball and supper in the evening was a most successful affair.

Abstracts of the two papers and reports of the discussions follow.

The Electrical Industry and the Public.

(Abstract.)

The full title of Mr. A. G. Bruty's paper was "The Mutual Responsibility of Contractors, Manufacturers and Supply Undertakings (*a*) to the Electrical Industry, and (*b*) to the Public." In his opening remarks the author said that the mutual responsibility of the supply authorities, manufacturers and contractors to the electrical industry lay, broadly speaking, in the direction of augmented goodwill, mutual recognition and increased co-operation. To the public it lay in the direction of conscientious work and efficient service. The full realisation of the mutual responsibility of the units of the industry to the industry must find expression in terms of the reward secured for energy expended. At present the reward bore no relation whatever to the energy expended. In so far as the three parties co-operated to give the fullest service, to that extent they discharged their mutual responsibility to the consumer and to the same extent their duty to the industry. That aspect of their daily work was too frequently overlooked, and even those in authority were not free from blame in that respect. The question of tariffs was of vital importance to manufacturers and contractors, and their interest in the matter ought to be appropriately recognised. Yet the Electricity Commissioners' Committee upon the subject was composed of supply authority representatives. The contractor undertook the consumer's difficulties as well as his own, and he could speak with authority about the consumer's requirements. He could give extremely valuable guidance to any committee dealing with tariff and supply conditions. That was no less true of the manufacturer. Unless rates were attractive and conditions of supply free from irksome restrictions there was a drag on the wheel of electrical progress, and its reactions were felt throughout the industry. Conditions which made the cost of the starting gear on the simplest and smallest electrical power installation more expensive than the motor ought to be the subject of inquiry, not by station engineers alone, but by representatives of all interested in the matter. Another matter, in which manufacturers and contractors had a very definite interest was the practice of many supply authorities of making a charge for bringing in the most simple of services. It was said that it did not pay to put in a service for, say, a few lights. That could not be challenged, but experience showed that in due time the lighting load would be increased and an iron, kettle, radiator, and all the rest would follow. Most important of all, there was the question of the cost of electrical energy. Rates attractive enough to encourage heating and cooking, except as emergency or short-hour expedients, generally speaking, had not been available until comparatively recent times, and even now were by no means general. When the national supplies were re-organised in Great Britain and Ireland, a market for the promised abundant supplies had to be found. It could only be found by the co-ordinated effort of all engaged in the industry; by each section specialising in its own branch, avoiding overlapping and duplication of effort. In the Irish Free State the generation, transmission and distribution of electricity for the whole of the country was in the hands of the Electricity Supply Board. That Board had been given powers to wire, hire, sell, &c. During the passage of the Bill through the Dail, the Irish contractors endeavoured to secure amendments that would leave the position in the Irish Free State no worse than in Great Britain, but they failed. The idea of agreeing to the recognised retail price of an article was abhorrent to the authorities. The public, who were quite prepared to pay the proper price for other articles, were to be State-assisted in their electrical requirements. Full use was being made by the Board of its powers. Wiring work was being carried out, and showrooms had been opened for retail sales. Prices for wiring work were such that no responsible contractor who wanted to remain in business could possibly quote. There must be a loss on every light wired, and a private trader could not compete in such circumstances. The contractor had to comply with special requirements issued by the Board; his work had to pass the inspection of his competitor, and he had to reveal his client's identity to that competitor before commencing a job. The contractors would not allow themselves to be squeezed out. It was to be hoped that the Board would before long recognise their position and co-operate with them. The public in the Irish Free State had a very real interest in the matter, as if there remained but one source of supply for all electrical requirements, the absence of competition would leave no incentive to give any service worth the name. Into this welter of cut-throat competition came the English manufacturer, not to help his friends, but to aid and abet the opposition, with an utter lack of responsibility. A group of manufacturers, with whom the Association's Trading Committee had very cordial relations, was supplying material to the Board at a price at which no one in England, Scotland, or Ireland, could purchase it from the same source. Vigorous protests were made, although it was said that the quality or material was lower than the standard purchased by E.C.A. members, and was supplied without guarantee. The Association stood behind its Free State members and matters were put to rights. Another group of manufacturers within the last few weeks had got into difficulties, and left the contractors in an unenviable position, because they failed to realise that the E.C.A. existed for any purpose other than its own selfish ends. Without consultation with people most competent to advise them, these manufacturers entered into negotiations, and made concessions and agreements, ignoring the consequences. This revealed a complete lack of a sense of responsibility to the industry, and showed the manufacturers to be blind to their own interests. In Great Britain things seemed to be managed somewhat better. In certain quarters there was a strong desire on the part of the manufacturers to co-operate with the organised contractors to secure fair trading conditions. Progress was slow, however, and very disjointed. The object should be to ensure that electrical goods should take the shortest route from the manufacturer, through *bond-fide* channels to the consumer. The increasing volume of business secured by manufacturers last year was for the smaller class of apparatus rather than for contracts of considerable magnitude. That indicated that expansion in domestic electrification was taking place, and it was in that direction that the contractor's activities very largely lay. In one recent issue of the ELECTRICAL REVIEW it was reported that at three annual meetings of shareholders complaints were made that output had increased, but profits were stationary and inadequate. The contractors also suffered from this in an acute form. Co-operative effort would appear to be the line to follow, and with goodwill the problem should not long remain unsolved. The contractor occupied a key position, as the co-ordinator of the efforts of the other units of the industry into the ultimate services rendered to the public. They had not always looked upon their duties quite in that way. They had allowed themselves to be regarded as sort of necessary evil—a poor relation—instead of assuming as a right their proper place. A few years ago the contractors' besetting sin was apathy. To-day, that was not quite true; there had

been a distinct increase of interest in Association matters. They could not say that apathy had disappeared, or that they were entirely free from the armchair critic within their ranks. Constructive criticism was always of value, but the critics of the "what-is-the-good-of-anything" type were past praying for. The author appealed to members to throw off what remained of that apathy and to assist and support the E.C.A. and its activities. On every side there were evidences that the public were daily increasing their electrical demands. As the public acquired more and more the electrical sense, the demand would continue to increase until finally the "all-electric" house would be the rule, and not the exception. They were still looking for a complete solution of the domestic hot water problem. Although considerable advance had been made, it was quite unusual to find electricity used for domestic hot water, except perhaps during the summer or for topping up during the night in the winter. The general adoption of 230 V a.c. in Great Britain and 220 V a.c. in Ireland made it necessary that definite minimum requirements for the prevention of injury from shock and risk of fire should be strictly enforced. Power driven machines (refrigerators, washers and the like) were being introduced into the dwelling house, and efficient provision for protection from damage by rotating machinery should be made. Manufacturers must see that domestic appliances were so designed and suitably constructed to provide the contractor with adequate means for ensuring protection to the user; the contractor must see that those means were efficiently utilised, and the supply authorities should be empowered to refuse to connect a supply to any premises where unsafe apparatus was installed. Only a small proportion of the appliances at present on the market had been designed with any efficient means for protecting the public. Contractors had it very largely in their own hands to rectify this by refusing to permit in any installation for which they were responsible any apparatus not made, so far as humanly possible, danger-proof. The matter could only be effectively dealt with by the whole industry acting together. He had heard it stated that unless there was something in the installation likely to interfere seriously with the general supply to other consumers, supply engineers were indifferent as to what went on on the consumer's side of the meter, so long as the current consumed was duly registered and paid for. He hesitated to believe that such views were held by any number of responsible station engineers. Compulsory regulations for electrical installations were long overdue. What hope was there of securing them unless they had the whole-hearted support of the other sections of the industry? Whatever the objections they should be made known and efforts made to meet them. Was it not possible for the Association to enlist the assistance of organised manufacturers and supply authorities and with united strength press in the proper quarter for appropriate action? Another matter of combined interest to the industry and its relations with the public was that of the training of labour. The final touches which made or marred carefully-designed installations were in the workmen's hands. He would like to see some attempt made to increase the usefulness of the present apprenticeship schemes by the interchange of selected apprentices between manufacturers, supply authorities, and contractors. There was one direction in which combined effort had rendered excellent service to the industry and to the public. He referred to the National Register of Electrical Installation Contractors. The success which had attended that co-operative effort should encourage them to further efforts along similar lines. Even if the time was not ripe for fuller discussion of trading and other relations within the industry itself, the same could not be said about its responsibility to the public. If they were in real earnest—as he believed they were—in the matters of service to and safety of the public, they should invite the other sections of the electrical industry to co-operate with them in the pursuit of compulsory wiring rules, compulsory registration of contractors, danger-proof electrical appliances, &c., where inter-section goodwill or united pressure on outside bodies was necessary to secure the end in view.

Discussion.

A keen discussion on the address was opened by Mr. W. R. RAWLINGS (London), who said that the contractors had to strive to get closer together, politically, socially, and commercially. The quarrels of the past between the different sections of the industry no longer troubled them. He hoped the paper would hasten the fusion of the various sections. Some fifteen years ago a suggestion was made that the whole of the electrical associations should get together as one association. He believed the time was coming when that would be achieved. The tendencies were in that direction. He called attention to the B.E.A.M.A., representing the whole of the manufacturing industry. Could B.E.A.M.A. not join with them, or they with B.E.A.M.A.? They were really responsible for B.E.A.M.A. In the early days, when the electrical contractors wanted someone to give them discounts, the manufacturers formed an association. Now that association, which started in humble circumstances, had offices which suggested wealth and affluence. All sections were also represented in B.E.S.A., and then there was that representative organisation, the Institution of Electrical Engineers. They had, of necessity, started a series of sectional associations to realise their aims, but they wanted to work together for the common good and to serve the public.

Mr. H. H. BERRY said that Mr. Bruty had made no reference to the wholesaler, and suggested that this was probably due to the fact that he had grouped the wholesaler with the manufacturer as part of the necessary machinery of distribution. He wished to make two constructive suggestions. The first was that put forward by Dr. Ferranti at an executive meeting of the Council of the E.D.A., that when the Electricity Commissioners were able to secure a cheap supply of electricity for the rural and suburban areas there should be a uniform tariff throughout the country. It was a remarkable conception, in his opinion. There might be different rates for lighting and power, and the varying cost of distribution could be met by a variable fixed charge. His second point was that some machinery should be set up for giving efficient service to the public—a bond of sympathy between those who supplied current, the electrical manufacturers, and the contractors. This should result in the most reliable service to the public for its domestic requirements.

Mr. H. C. HAZEL (Liverpool) indicated that E.D.A. might be the body that could bring the ideals outlined by Mr. Bruty into effect. It had no axe to grind, and it functioned for the benefit of the whole industry. Regarding the complaints so frequently made about charges for bringing in services, he contended that where the consumer lived within a reasonable distance of the mains there should be no charge. This charge for services had lost customers, both to the supply authorities and to the contractors. People had installed gas rather than submit to it. It would be to the advantage of manufacturers if the contractors who handled their products were more often consulted.

Mr. R. GRIERSON said that they had to deal with two classes of people, one of which thought electricity was desirable, but likely to be expensive, and the other which had tried it and knew it to be expensive. At the Torquay Conference they had heard that, as a result of the favourable rate at Brighton, the results were phenomenal during the past year or two, and it was argued that these financial results at Brighton were the proof of the pudding. But he asked those present to consider, in their own towns, the units sold per head of population and the tariffs, because that was the key to the situation. It was by this means that they might find the "yard-stick" whereby to measure the success or otherwise of their local undertakings. He quoted figures showing that there were several towns selling a greater number of units per head of the population than Brighton, such as Hampstead, Wimbledon, Chester (central area), Bedford, and Watford. Electrical energy was not a luxury for the few, but a public utility which the public would have eventually, no matter what people stood in the way.

Mr. H. W. ROBERTS (G.E.C.) said that in the past they had aimed at cheapness rather than quality and service. The supply authorities invariably told the contractor that cheap wiring would mean plenty of customers, and the contractor replied that cheap current would mean more consumers. To-day they all recognised quality and service, and he felt that the undoubted move in the upward direction was due to that recognition. It was somewhat difficult for the manufacturer to consult a few thousand people. In the matter of the domestic hot water supply they would have to recognise that the registered plumber was coming into this business, and it was going to be a question of co-operation between the contractors and the plumbers to bring about the development suggested. Mr. Bruty had mentioned that manufacturers must see that domestic appliances were of such quality as to ensure protection to the user. Manufacturers were always willing to produce what was called for; a very large share of the responsibility was on the buyer, and not on the manufacturer. He concluded by saying that contractors might do better by paying more attention to the counter trade.

Mr. J. H. ASDELL (Birmingham) said the canvassing question also entered into the matter of co-operation, and he thought that manufacturers and municipalities could go hand-in-hand with the contractors in that direction, instead of acting separately. All contractors should strengthen E.D.A. in order that the association spirit might be developed.

Mr. LL. B. ATKINSON (C.M.A.), dealing with the suggestion in Mr. Bruty's paper that the English manufacturer had, in Ireland, aided and abetted the opposition, said the incident referred to related to transactions to which the Cable Makers' Association was a party. He thought that Mr. Bruty, perhaps unconsciously, had not given a fair impression of the matter. The Cable Makers' Association was approached by the Irish Electricity Board, and asked if, as a group, it could undertake the wiring of hundreds of thousands of houses in a few months. The association replied that contracting was not its business, and referred the Board to N.E.C.T.A., who agreed to do what it could to assist in a grouping of contractors to do the work. There were prolonged negotiations in which, from time to time, the cable makers were asked to say what could be done. Nothing happened whereby any grouping of English and Irish contractors was successful in coming to terms with the Board. The C.M.A. was then asked by the Board whether it would supply cables of a standard not current in this country, and which he and others considered not suitable for the purpose

(*Continued on page* 11.)

The E.C.A. at Bournemouth.

The New Pavilion.

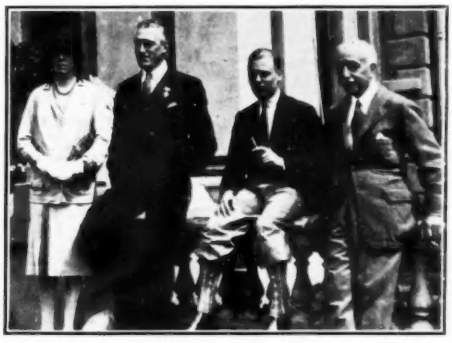
The Town Hall Gardens.

A Breathing Space.

The Centre of the Group.

Constant Readers.

Outside the Royal Bath Hotel.



Mr. and Mrs. T. F. Lummus,
Mr. G. J. Berry and Mr. H. F. Simon.

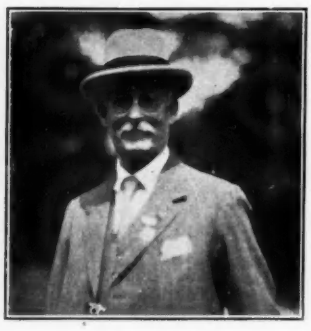
Mrs. and Miss Rodgers
and Friend.

The Youngest Delegate.

Messrs. Aish and Kennedy.

Coming Ashore.

The Presidential Smile (before assuming the cares of office).



Mr. Ll. B. Atkinson. (Cable Makers' Association).

Messrs. Berry, Senr. and Junr., and Mrs. Atkinson.

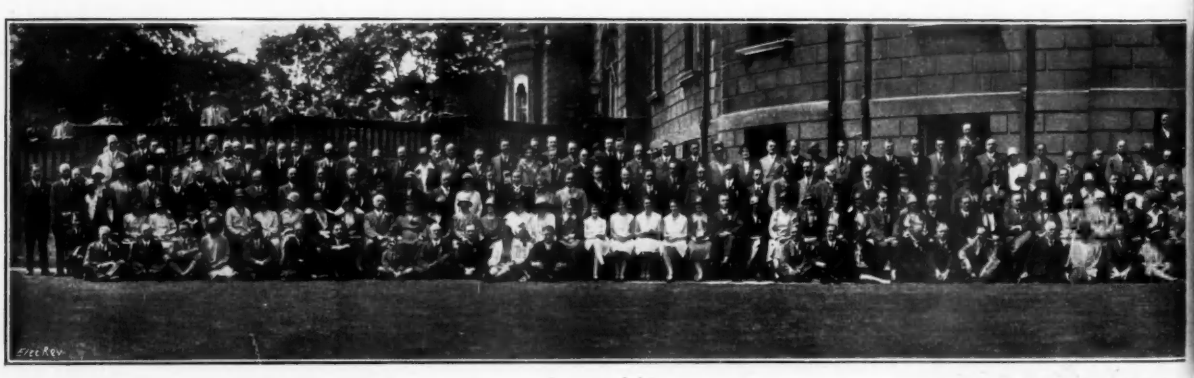
Mr. W. A. Shaw (Past President) in conversation.

Messrs. C. H. Cox, P. F. Crinks, H. A. Lingard, and A. B. Wishart.

On the Gangway at Southampton Docks.

Leaving the Conference Hall after a Morning Session.

Messrs. A. G. Beaver, R. W. Smith, and J. Snow Huddleston.



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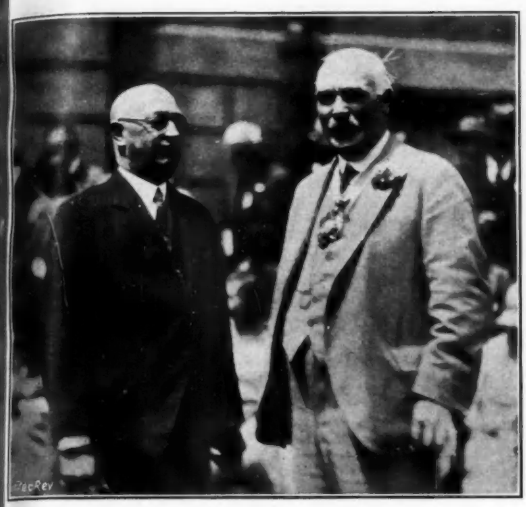
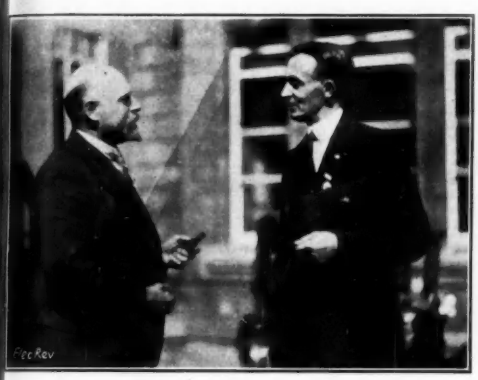


Mr. Walton and the Mayor.

Mr. Marryat Expounds his Views.



Messrs. W. Riggs and A. G. Bruty.

The Secretary, Mr. Penwill.

Messrs. F. H. Starling and H. T. Young.

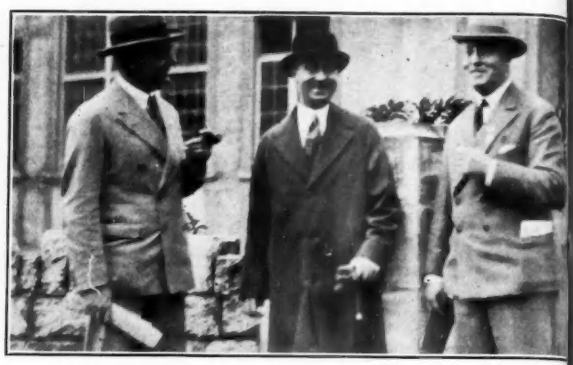
On Board.

The R.M.S. "Aquitania."

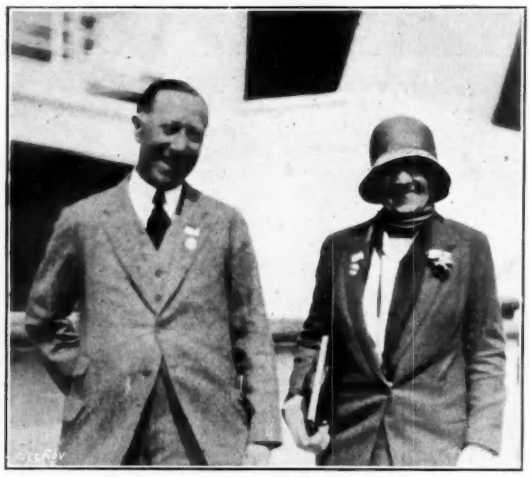
Going Below.

—the Bournemouth Gathering.

The Sheffield Contingent.

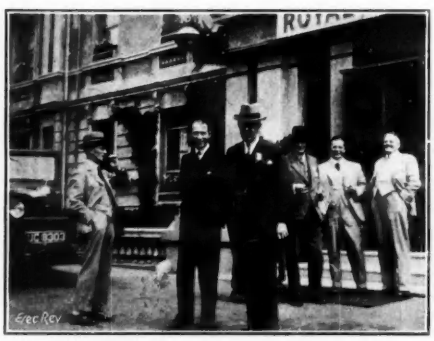


Mr. T. R. Martin and Friends.



Mr. and Mrs. Willoughby Ellis.

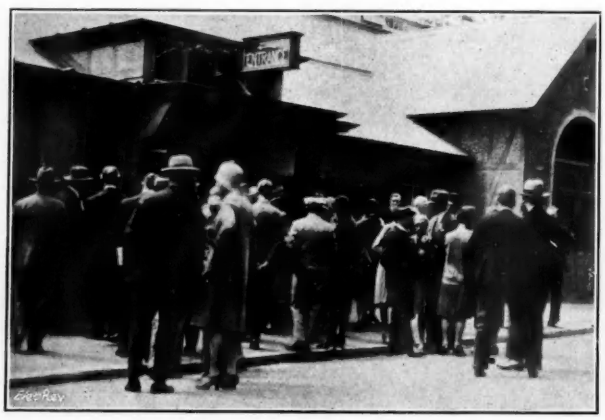
Delegates from Birmingham.



Mr. C. W. Sully and Friends outside the Royal Bath Hotel.

Miss C. Haslett.

Returning from Southampton.



The End of a Session.

In Holiday Mood.

in Ireland. The Irish work had been very largely carried out by Germans, and in many respects they had used standards quite different from the British. He (the speaker) then wrote to one of the prominent contractors to ask whether there was any objection to the cable makers trying to see what they could do on their own. The next stage was that the Board asked for cable to a specification which no member of the Cable Makers' Association would supply to anybody. A quotation was made to the Board entirely on the Board's responsibility and without guarantees. A certain amount of the cable was supplied, and then it was reported that the Board was not employing any contractors for the installation work, and that it would not supply the cable to any contractors outside its own scheme. The C.M.A. then decided that after the completion of outstanding contracts it would supply no more of the cable.

Mr. B. GILL (Leicester) urged the necessity for local development committees to bring about co-operation with the power companies and to get a proper understanding between them and the contractors.

Mr. C. W. SULLY (E.L.M.A.) mentioned that the president had indicated that during the past year there had been closer contact between the contractors and his Association. Among the members of his Association there was a view that the E.C.A. members were looking at things in a more broad-minded manner than before. Possibly this was reciprocated. E.L.M.A. recognised the Contractors' Association as the key to the retailers' industry, and hoped the time would come when it would represent the whole of the retail organisation.

On the question of standardisation he pointed out that the lamp manufacturers had taken a very definite step in that direction, which he hoped would be followed by other sections of the industry. He asked the E.C.A. to support every effort made not only to modernise and improve lighting, but towards the standardisation of lighting. He strongly advocated the encouragement of E.D.A. circles, because they brought all sections of the industry closely together in local centres.

Replying, Mr. BRUTY dealt with Mr. Atkinson's explanation of the action of the Cable Makers' Association and the Irish Electricity Board. He emphasised that contractors in Ireland were having to meet State-financed competition, and they were not getting a fair chance. He was not satisfied that any firm of standing should supply a cable without a guarantee. In that action the cable makers took away from the contractors the only argument they had of any potency.

Contractors and Rural Electrification.

(Abstract.)

In presenting his paper on "The Contractors' Part in Rural Electrification," Mr. H. R. Taunton said that he was not ashamed to admit that he knew nothing about rural electrification in Great Britain, and what it would mean to the country, to the farmers, and to the electrical industry, because he doubted if any of his hearers knew much more about it than he did. So far the first experiment had only just begun, and until that experiment had run its course, they could not dogmatise on its results. If they were poor, the scheme, presumably, would be modified and curtailed. If they were good, if the demand came up to hopes and could be met on sound financial lines, we should be at the beginning of a new era, with possibilities at which as yet we could only guess, and with benefits to the community at large, and to the agriculturalists in particular, which would be reflected in an enormous development of the electrical industry. Electrical contractors had an essential part to play in the development of the electrical industry, and they might reasonably hope to obtain their share of the benefits which would accrue if rural electrification came to its anticipated success. They must not wait for the success of the experiments, but must work with the rest of the industry to make them a success. If they left the spade work to others, they could not expect to be allowed presently to wander into the garden and pluck the fruit. Like the other sections of the industry, the suppliers and the manufacturers, they might fairly look for a reward for their special labour. The main purpose of the paper was to discuss how they might best ensure that that reward was adequate. Until they had definite data of the demand, their plans could only be general, and the organisation to give them effect merely tentative. What had been achieved in America, Sweden and Denmark might be repeated here, but conditions were different. In America farms were much larger, and in Scandinavia the farmer had the benefit of highly organised co-operation. In both cases rural electrification had had the vast advantage of cheap supply from water power, distributed by methods more elastic and less costly than was advisable in so densely populated a country as ours. In considering the probable demand they had to take account of several adverse factors. One of them was the intense conservatism of the small farmer. The difficulty was not to make him see the advantages, but to persuade him to so definite a departure from the ways of his fathers. Then there was the initial expense. The success of the scheme depended on a large demand for power, with a corresponding initial outlay on equipment; the lighting load must be negligible in comparison. There were few farms which had not an engine of some sort whose existence would blunt the canvasser's arguments for electric motors. The question of initial expense had to be considered again from the supply authorities' point of view. A h.p. tapping cost about £350, which meant that the authorities must recover £18 to £20 per annum from the consumer before they could write off so much as the interest on the tapping, to say nothing of the service line. £18 to £20, on any reasonable tariff, was a fairly large consumption for a small farm of anything up to, say, 200 acres. Much of the heavy work, such as threshing and ploughing, was only seasonal; and most of the smaller machines were only used intermittently during the day or the week. It was difficult to see how it would pay to give a supply to isolated farms, unless they were above a certain size; and so many of our farms were both small and isolated. The supply authorities would at first probably concentrate on the larger farms and the small villages, particularly on the latter, where much was expected from the development of rural industries. The two problems in which contractors were interested were to educate the farmer and the country dweller to the advantages of electricity, and to persuade them to the necessary outlay. If, through any real or fancied neglect of the contractors, the suppliers were disappointed of their expected load, they would be forced to undertake their own canvassing. That meant their own selling organisation, and eventually their own installation department. Always the lethargy of the contractors had been made the excuse for similar developments in urban areas. If they allowed the companies to get into the habit of doing their work in the country, they would carry the practice in the towns further than they did now.

As reasonable business concerns, supply authorities would be glad to be spared the worry and expense of canvassing and contracting if they could otherwise secure their load. The case was otherwise with manufacturers. A maker of electric motors was not going to sit back and leave selling to an electrical contractor who might send his orders to any of a score of competitors. And so with the makers of heating apparatus, fittings, and lamps: each would want to fight for his own hand, and all at the expense of the contractor, who would soon find his profitable activities cut down to the bare wiring. There would be scrambling for orders, cutting of prices, illicit discounts, and illicit installation work: the same old abuses of the town, intensified by the novel circumstances. However, the E.C.A. Trading Committee had waged a fairly successful fight against them in the past, and no doubt was fully alive to the dangerous possibilities in the future of rural electrification.

At the worst, the contractor had certain initial advantages. He had local knowledge, and could offer a potential customer a complete and balanced scheme, relieving him of the responsibility of co-ordinating the various parts of it. He should be able to give the impression that he was an unbiased expert, with a knowledge of all competing apparatus, and no interest but to advise the buyer so that he bought the best within his means. He had to ensure that the farmer turned to him for definite details and prices.

How were they so to order matters that the employment of one contractor for the whole of an installation should come to be considered the right and inevitable thing? Naturally, each of them would do what local advertising and circularising the circumstances demanded; and those who could afford it would employ one or more canvassers equipped with motor-cars—the only practicable method of canvassing in the country. But inasmuch as the important point was that what orders were going should go to some member of the contracting industry, rather than be split up among competing manufacturers and suppliers, the local advertising and canvassing should be supplemented by an organised sales effort on the part of the E.C.A. Funds would not allow of a national campaign of newspaper advertising on an effective scale; but they could prepare a range of pamphlets, folders and leaflets proclaiming the advantages of electricity, and stressing the importance of employing only responsible contractors. This literature could be either broadcast from headquarters or sold at cost to members, for over-printing and local distribution. Another economical form of propaganda would be the equipment of an E.C.A. stand at the many agricultural shows up and down the country. One equipment would serve a large number of shows; and after the initial expense, the only other serious ones would be the rental of space and the salaries of attendants. Visitors would be given a card of introduction with the names of the local members, and it would not be difficult to devise a scheme by which the member ultimately benefiting would pay some small commission to the E.C.A. towards the expenses of the stand. Apart from inquiries, stands at agricultural shows often paid for themselves by direct sales. In that case the proceeds, after a deduction towards the running costs, could be divided among local members.

A substitute for the stand would be a travelling van or lorry equipped with suitable apparatus and with motors of various sizes, fed by trailing cables from a generator run off the car engine. It would be easy to couple up one of the portable motors to any of the farm machines and give a practical demonstration of the speed and ease with which electricity can milk cows, churn butter, &c. A large-dial

D

meter, calibrated for the local flat rate, would at the same time convince the farmer of the economy of the process. Any definite results, whether in direct sales or inquiries maturing into orders, could be dealt with on the lines already suggested for the show stand. If the farmer was so far interested that the only thing holding him back was the initial cost, hire-purchase was the key of the problem. Every day this was becoming more and more the financial basis of popular business and, judging by results, a sound basis. It had to be recognised that the only chance of securing the class of business offered by rural electrification was by a whole-hearted adoption of the only method of paying for it possible to new prospective customers—hire-purchase. To supply companies and corporations, and to manufacturing firms, with large capital resources, the financing of a wide scheme of assisted wiring and hire-purchase of apparatus was a simple matter. Contractors, however, had to face peculiar difficulties in organising any scheme of hire-purchase. The average contractor in rural areas, called upon to finance, on the slender resources of the capital not employed on his general contracts, an increasing number of fairly large installations, would soon find himself unable to meet his current wages bill. Without assistance of some sort, the hire-purchase inseparable from rural electrification was utterly beyond the capacity of 95 per cent. of the members. Their only hope was in some scheme of co-operation, by which individual members would be assisted by a central organisation with a common fund. The E.C.A. was the obvious central organisation; the common fund was, unhappily, less obvious. It was surely not beyond the wit of man, still less beyond the able wits of the Finance Committee, to devise means for raising an adequate fund. An issue of shares to members, or possibly to the general public, was a feasible solution; or, under certain conditions, a Government loan might be obtainable. The return on the capital would be in the shape of the interest charged to the purchaser for the accommodation, and the interest on the accumulation of instalments, on the lines familiar in building societies and other organisations financing general hire-purchase schemes. The security would be exceptionally good; and if the E.C.A., or the new finance company which it would control, collected direct from the purchaser, little loss from bad debts need be feared. If it were found advisable to work the scheme entirely through the contractor concerned, no doubt suitable safeguards could be arranged to secure the same result. When the country dweller had given them his order, it was their duty to maintain a high standard of installation work. By education of the consumer, by by-laws and legislation, if it was possible, they must strive to eliminate the unfair competition of the "jerry" wireman. Their aim should be to limit wiring in rural areas to members of the E.C.A., and of the National Register; and to take the most drastic action against any member who betrayed their ideals of safe and sound workmanship. One fatality in a rural area, which could be laid at the door of electricity, would have disastrous effect on the expansion of the scheme, and their first duty to their new customers was to protect them against such a possibility. He would like to see the E.C.A. prepare suitable wiring specifications for farm installations and work for their acceptance, not only by its own members, but by the authorities concerned. Personally, on the score of economy and safety, he favoured cab-tire, or some similar all-insulated system; but it was largely a matter of opinion. Whatever system was used, they must not sacrifice in cut-throat competition the high standards with which the E.C.A. was associated. They must strive not only to secure the farmer's order, but also to secure and retain his confidence.

Discussion.

Mr. W. RIGGS (London), who opened the discussion, thought the subject could be divided under two heads—rural electrification as it affected the farmer, and as it affected the villager and village industries. Many contractors still held the opinion that the farmer was not a business man; on the contrary, he realised that time was now more important to him than ever before, and it appeared almost certain that if he were approached in the proper way business could be done with him. The farmer did not ask for credit, and if he could be shown that he would derive advantage from the use of different machinery he would find the money to make use of it. The supply company would be taking on a difficult task. The cost of tappings was always prohibitive unless there was a congested area—a number of farms to which the supply could be given. But in this country, unlike America or the Continent, the farms were isolated. He did not think that the suppliers could expect any profit for some time in return for their outlay. The case of the villages was more simple. The taste for electricity there was well developed, and the advantages of electricity had also been made known to the women's institutes, and it was astonishing to find a fairly big demand for electricity for lighting. This was a virgin field for the activities of contractors, and gas competition was absent. His impression was that rural electrification would begin in the villages and spread from them to the farms.

Mr. W. F. FURSE (Nottingham) agreed that there was a big field, and he believed that contractors were enterprising enough to deal with the situation. But to go in for an extensive campaign, or expensive propaganda, was, in his opinion, shooting in the dark. They had no monopoly; they had no real speciality, and if they fertilised this new ground probably the "kerbstoner" would reap the benefits. Dealing with the position of the supply companies, he told, in an amusing manner, the story of a country squire who made it worth while for a company to bring its supply to his premises, because he got the rectory to adopt electricity, the church, the schools, the village "pub," and other institutions. The contractor had first to discover what the supply companies were under obligation to do in the territories not yet touched, and then get them to do it, and, secondly, to make a dead set at the principal consumer. Then they would have done their business before the "kerbstoner" got a start.

Mr. H. T. YOUNG (London) said the subject bristled with difficulties, but if the contractors saw nothing but difficulties few of them would do very much. In this country there were so many small holdings. They would have to begin again, both in the villages and the farms, with lighting and small utensils. From that starting-point they would have to develop. A hire-purchase system was necessary, and possibly the Government would take a hand in it. However low the price of electricity the benefits were too often neutralised by the cost of the service. Contractors would do well to co-operate with E.D.A. In conclusion, he remarked that the farmer's wife would be a very influential factor in spreading the use of electricity in the rural areas. They should enlist the sympathy of the farmer's wife to get business with the farmer, and in this connection the Electrical Association for Women could be of very great assistance.

Mr. E. A. REYNOLDS (Birmingham) said that the Shropshire, Worcestershire and Staffordshire Electrical Power Co. had carried out a considerable amount of rural development over an area of 2,000 sq. miles. Its overhead mains at the end of last year comprised 33 miles of 66,000-V line; 27 miles of 33,000-V line; 119 miles of 11,000-V line; and 152 miles of l.p. distribution. Since last December the last two figures had increased to 160 miles and 200 miles. It suggested that in this area rural electrification was past the experimental stage. It was found that the consumers first applied for lighting and then for power and heating. Some of the villages were more profitable than the small towns from the point of view of current consumed. The load was up to the company's expectations, and sufficient to justify extensions which were being carried out at present. The figures given by the author for the cost of tappings appeared a little out of date. The cost of tappings given by the company was: For 50 kVA, 3-phase, at 11,000 V, £155; for 20 kVA, single-phase, at 11,000 V, £90; and for 10 kVA, single-phase, at 11,000 V, £65. Rural consumers could be dealt with best through local firms who had representatives living in the district and who were well known to the inhabitants. The contractors would find it difficult to deal with the competition of the local ironmongers.

After emphasising the advantages of propaganda, Mr. Reynolds said that the S.W.S. Co. was equipping a large experimental farm at which all interested in agriculture could see the latest electrical processes tried out. The company had a scheme of assisted wiring which was worked by contractors on an approved list, who were also members of an E.D.A. circle formed by the company.

Mr. LL. B. ATKINSON (London) agreed that at some stage the question of hire-purchase, or hire without purchase, would have to be faced, but whether the E.C.A. should be the body to plunge into this somewhat complex financial matter was what they would have to decide. He thought they would have to separate the supply of wiring installations from the apparatus. The latter could be removed if payments failed. With regard to wiring the supply companies should take a hand, for they could threaten to cut off the current if payment failed. The Electricity Commissioners had set up a committee to suggest reasonable lines upon which to carry out hire-purchase. The smaller districts and the smaller supply authorities had not the organisations for dealing with it, nor could they afford to set them up. The Committee wanted a scheme that would be generally applicable. He thought that before long there would be a report forthcoming on the question.

Mr. F. H. STARLING (Nottingham) said that the contractors could do nothing until they knew when the supply would be available. In the matter of costs at the farms, he suggested that the principal expenses would be for overhead transmission and the supply of motors.

Mr. A. G. BRUTY (Dublin) said that owing to the smallness of the farms in Ireland he did not expect there would be a very great demand for electricity from that source. He spoke of the possibilities of electricity in other directions connected with agriculture, and mentioned the use of plant for egg incubation on a large scale.

Mr. H. MOSS (Bradford) said his greatest fear was how, in the villages, they were going to prevent the local ironmonger, the cycle dealer, and the garage people undertaking the wiring. He looked forward to the day when their industry would be granted protection from the parasites now posing as electrical engineers.

Replying, Mr. TAUNTON agreed as to the need for legislation for keeping the "kerbstoner" out. He thought the general consensus of opinion was that the electrical contractors could take their full share in the work of rural electrification. They could do the work and arrange the finance, either as a body or through finance companies.

The I.E.E. in France.—III.

An Account of the Summer Meeting.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

BY the courtesy, and as the guests, of the Cie de Chemin de Fer d'Orléans and of the Cie des Chemins de Fer du Midi most of the Institution of Electrical Engineer's visitors to Paris proceeded to the Pyrenees for the last week of their stay in France. The party numbered over a hundred, and in addition there were some French members of our French hosts' association, the Société Française des Electriciens, the president, Mr. Paul Bunet, honouring the party with his presence and assistance. As both he and his wife spoke English this was a great asset. Mr. Parodi, who is well known to English members, as is also his recent paper on French railway electrification, saw the party off at Paris.

Several members were allowed to ride on the electric locomotive during the first part of the journey to Vierzon, the end of the Orléans electrified section. They found it to be a very interesting experience and were able to persuade the driver in charge to "let her all out." On arrival at Eguzon a visit was paid to the new hydro-electric generating station that now supplements the power obtained from the Paris thermal stations for the electrified section of the Orléans railway, which was probably the most difficult section of the line to electrify; still it is the portion where the most coal is consumed per mile. The Orléans line is all the more interesting since it is a very good example of the electrification of a main-line railway. The overhead catenary-suspended conductor is operated at 1,500 volts d.c., obtained from rotary sub-stations. The latter become quite a familiar sight to the traveller as he speeds along, for they are all standardised and therefore similar, and are of the characteristic outdoor type, constructed of steel lattice work. The high-voltage transmission is carried out at two pressures, according to distance, *i.e.*, at 90,000 V and at 150/200 kV.

At present 50,000 kW, divided into five sets, is available at Eguzon, generated at 10,000 volts, 50 cycles, which periodicity is now standardised in France as it is in other countries. Another station at Coindre is practically ready for use, while two more installations of plant at La Cellette and Marèges are under construction.

The visitors were generally impressed by the comparatively slight structures that are employed as towers to carry the extra-high-pressure lines. However, the design seems to be justified, for apparently no trouble has occurred.

Aluminium conductors with steel cores are employed on the 90,000-volt lines. They have a total section of 238 sq. mm., of which the aluminium accounts for 193 sq. mm.; the diameter is 20.1 mm. The conductors are suspended from six chain-type insulators of the Hewlett pattern (seven are employed at the anchor towers) and the towers are spaced about 230 yards apart, the height of the conductors above the ground at the centre of the sag being 28 ft. Above the conductors an earth wire is run (60 sq. mm. in section). For the 150,000/220,000-volt lines, the chains consist of 10 insulators (11 at the anchorages); the section of the conductor is 293.8 sq. mm. (22.3 mm. in diameter). The spacing is 260 yards and at the maximum sag the height above the ground is 34 ft. There are two overhead earth wires for these lines.

From Eguzon the party was driven back to the railway at Saint-Sébastian, *via* the pretty valley of the Creuse and the ruins of Crozan, thence proceeding to Bordeaux to pass the night. On the next day the Midi electrified-railway system was inspected, including the mercury-arc rectifier station at Pau. The Midi railway finds this class of sub-station to be quite as satisfactory as the rotary class, though both have their operating difficulties under railway conditions. In the evening, after viewing the sub-station and also admiring the wonderful panorama of the Pyrenees that is to be seen from the elevated terrace at Pau, the party was entertained at dinner by the South-Western Local Centre of the Société Française des Electriciens, as was mentioned last week.

Fig. 1.—The Presidents and their Ladies.

Fig. 2.—It was Hot at Le Hourat!

Fig. 3.—Mr. and Mrs. Bunet and Mr. Grosselin.

On the Friday morning, June 21st, a special train carried members from Toulouse to the town of Carcassonne; after luncheon, the fine old city (some views of which are reproduced herewith), capital of the Aude Department of France, which has been famous since the twelfth century for woollen clothes, was visited, the party returning to Toulouse for dinner.

Next morning, Saturday, June 22nd, the party left by special train for Paris, where the official I.E.E. tour ended, the Quai d'Orsay station being reached soon after 10 o'clock in the evening.

During the past week various members gradually drifted home; for the visit terminated in Paris, and so it was amenable for some to prolong their stay. Those whom we have met since their return are enthusiastic over their expedition, particularly as regards the Pyrenees portion, which was done by motor-coaches instead of by train between Pau and Lannemezan. On leaving Pau the party entered the Pyrenees proper, *via* the Vallée d'Ossan, where the Haut-de-Gan sub-station

was visited, typical of the rotary sub-stations employed by the Midi railway and hence of interest in comparison with the mercury-vapour rectifier station visited at Pau the day before.

A very interesting feature of the Valée d'Ossan is that it is typical of the scheme that is being developed for using every drop of water in every valley. Three generating stations are installed: the highest (Artouste) utilises the fall between 6,400 and 3,670 feet; the next station uses the fall from here to 2,372 feet, while the lowest station at Hourat utilises the fall from the middle station to 1,681 feet above sea-level. Each is equipped with 7,000-kW, 10,000-volt, 50-cycle alternators driven by Pelton wheels.

All the stations are arranged for automatic operation (with provision for hand control if it should be deemed necessary at any time). This is really the most important feature of the Hourat station, which was selected for the visit as representative of the three stations. In other directions there was no radical departure from present-day practice. This station, like others visited, is noteworthy for its general simplicity of design and extraordinarily lofty building. In the case of all these stations, as well as the sub-stations, all the transformer and high-pressure switchgear is located out-of-doors.

The great drawback of hydro-electric stations is, of course, periodical shortage of water, which occurs in the Pyrenees in August and February. However, in the South of France this has been overcome by the joining together of all the forces (in more senses than one) of the generating companies (including the Midi Railway Co.) through a central organisation known as l'Union des Producteurs d'Electricité des Pyrenees Occidentales. A load dispatcher is located at Tarbes, who allocates the distribution of power over the whole area between Bordeaux and Carcassonne. Most valuable arrangements have been made with certain chemical and electrolytic works, whereby they absorb surplus power, and in times of shortage reduce their demand. In this way ninety-five per cent. of the available power generated is utilised, a wonderful load factor, and the sort of thing that makes hydro-electric development pay. To overcome the drought periods, some new thermal plants are in course of development at Tarn, which are designed to utilise the very low-grade coal that is to be found in the district. It is anticipated that they will provide 100,000 kVA.

From Lourdes the Garvanie valley was explored, where the generating stations of the Société des Forces Électriques and of the Société Hydro-Electrique de la Cère were seen. The design of the station building at Luz is very unusual, being in the form of a castle with gargoyles, instead of unsightly rainwater pipes on the exterior. Every care is taken in connection with the lay-out of the electrical installations not to interfere with the natural beauties of the locality; even the flume-pipes are camouflaged with paint, as was done in war time for buildings. More interesting than the sub-stations was the civil engineering work for their water supply. Much of the water is conveyed in tunnels, and in canals cut in the solid rock; hence the development cost must have been very considerable. At the head-works for Luz a small dam has been constructed and in conjunction with it an automatic sluice gate has been installed to the specifications of our host, Mr. Bunet. The sluice is balanced by a concrete counterweight and controlled by floats which rise with the level of the water behind the dam, and thus lets the water out underneath, causing much less wear and tear than a spillway.

Possibly the most interesting parts of the whole trip (apart from the splendid scenery) were the visits to the chemical and electrolytic works—not so much on account of their processes, but because of what they meant as load-levelling devices for surplus central-station power. The products of these works are chiefly artificial farm manures, *i.e.*, a material for which there is a seasonal demand; hence stocks have to be built up in anticipation, which means that a constant weekly output is not of prime importance. Previous experience elsewhere had been that chemical and electrolytic works must operate at full output all the time, and since the electric power consumption was always only a small factor in the total cost of the product, it did not pay to run the works to suit the conveniently available supply of electricity. Further, the furnaces and processes were such that once started they could not be economically varied, or closed down, without serious financial loss. The secret of the success of the plants in the Pyrenees, how-

Fig. 4.—The Wearers of the " Beret."

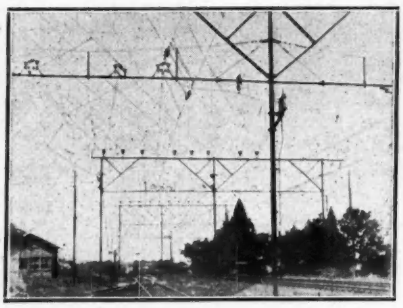
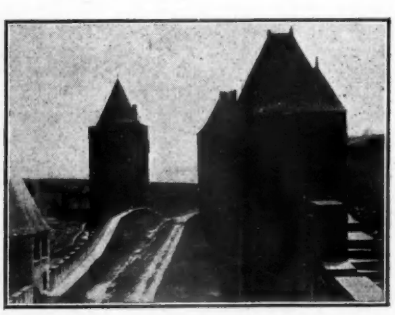


Fig. 5.—Railway Conductors at Lannemazan.

Fig. 6.—At the Hydraulic Laboratory, Toulouse.



Figs. 7, 8 and 9.—Views of the Old City of Carcassonne.

ever, lies in the fact that they have been specially designed to be quickly put into or out of service and for using currents that can be varied very considerably to conform with demands elsewhere. In the calcium-carbide furnaces current can be reduced from the maximum of 4,000 amperes to 10 amperes, though probably the latter only serves to keep the furnace hot until more current is available. A cold furnace of this new design can be put into full operation in three or four days, whereas the older type took a fortnight to get properly under weigh. Two works were visited. The first used a secret process (it will be appreciated that the party was privileged to see this factory) of the Société des Phosphates Tunisiens at Soulom. This factory was established during the war to manufacture sodium chlorate for explosives, which was produced from salt. Nitrates were also manufactured. Now it is chiefly employed in manufacturing ammonia, which is combined with calcium and phosphatic products to form artificial agricultural fertilisers. Nitric acid is also produced as a by-product, as in the fertiliser process it cannot be all absorbed.

At this works nitrogen was formerly obtained from the air by means of the electric arc, as is done in Norway. Now, however, it is separated by the liquefaction of the air, from which the nitrogen is evaporated, leaving the liquid oxygen. This plant was made by S. A. L'Air Liquide, of Paris. Owing to the operations of the combine that controls the oxygen market in France, the liquid oxygen cannot be used, for the royalties are purposely made too high. This seemed to the visitors to be a great waste of good material. Hydrogen is made by the electrolysis of water in British-made plant, manufactured by the International Electrolytic Plant Co., Ltd., of Chester.

The nitrogen and hydrogen gases are then highly compressed and passed into immensely strong vertical steel cylinders, some twelve feet high by two feet in diameter. Owing to the difficulty in manufacturing tubes to withstand the enormous pressures required, they had to be obtained from Armstrong, Whitworth & Co., of England. Electric heaters are used inside these tubes and iron is employed as a catylyser. In this way synthetic ammonia is produced.

At the works of the Société des Produits Azotés (nitrogen compounds) at Lannemezan, the chief feature is the electric-arc furnaces, which are in two sections, one for the production of calcium-carbide and the other for ferro-silica. The former is used for fertiliser production and the latter for sale to iron and steel works to control their mixtures of molten metal.

Calcium-carbide is used as a part of the works process, it being crushed to a powder and then electrically heated in cylindrical containers in an atmosphere of nitrogen to obtain calcium-cyanamide. The carbon residue is employed in making the carbons for the arc furnaces.

Electricity is delivered at the works at 60,000 volts. It is then transformed, by a battery of 20,000 kVA transformers, down to 12,500 volts, and conveyed at this pressure to the 2,500-kVA furnace transformers, which are placed alongside each furnace, though a wall is interposed to mitigate the effects of the intense heat. Two single-phase arcs in series are employed, obtained by means of two huge rectangular carbons, which can be lowered into the furnace to meet a horizontal carbon block in the bed of the furnace. The two arcs are formed between the lower ends of the adjustable vertical carbons and the ends of the horizontal block.

The automatic current control gear which was a mechanical feature of the early forms of carbide furnaces has been eliminated from this newer type, thus removing one element of complication. The upper ends of the carbons and the copper current connections thereof are cooled by coils of steel piping, through which cold water circulates. The process appears to be comparatively simple: three parts of coke are mixed with one part of slaked lime and piled up around the carbons, within a firebrick furnace. Carbon-monoxide gas is formed and burned in the furnace, while the molten calcium carbide collects at the bottom and is tapped and run out into pans at intervals. After cooling, the pan cakes, which weigh about two hundredweight, are first broken up into two-inch pieces and eventually pulverised in rotary pulverisers.

The all-importance of such processes as have been described above is, of course, that they are a means of utilising what would otherwise have been surplus energy.

In France, in 1926—the statistics for which have just been published—out of 4,562,262,000 kWh sold, 611,518,000 kWh were utilised in chemical and electro-metallurgical works, hence this class of consumption is nowadays a very important fraction of the whole output.

The hydro-electric power now developed in the South-West of France amounts to 338,520 kVA, supplemented by thermal power to the extent of 122,350 kVA.

This completed the technical portion of the visit, except for a call at the hydraulic laboratory of the Electro-Technical Institute at Toulouse, where larger scale experiments can be conducted than at Bellevue (Paris); a special channel, some fifteen feet wide, is available for this work, supplied by the main river. At Carcassonne the day was devoted to viewing the old walled Cité, whose double ramparts have been maintained in an excellent state of preservation, and the whole affords a most picturesque sight. Photographs innumerable were taken and the change from the somewhat strenuous task of visiting works was much appreciated. There was little of electrical interest, though it was noted that the street-lighting systems of both Toulouse and Carcassonne were of a high standard. The lamps were suspended by means of wires over the roadways along the lines of the new system now being installed on the Victoria Embankment, London. In Carcassonne, the current-limiter system of charging is employed

Among the industries of Carcassonne is the manufacture of one of the more successful types of electric plough now used in France; also the making of special friction-drive electric motors for operating the smaller types of barn machinery. However, time did not permit of an inspection of these, or the many electrically-equipped farms in the neighbourhood.

The concluding social ceremonies were a reception by the Mayor of Toulouse at the City Hall and a presentation during lunch at Carcassonne of a silver bowl by the ladies of the party to Madame Bunet, who had proved herself to be a most charming and capable hostess. The long train journey back to Paris was shortened by visits from compartment to compartment and the discussion of reminiscences of the tour. These are to be carried on further in the autumn, for at the suggestion of Lt.-Col. K. Edgcumbe, supported by Mr. H. T. Young (whose enthusiastic advocacy of the I.E.E. informal meetings is well known), the summer meeting is to be reviewed at an I.E.E. informal meeting in the autumn. Ladies are to be invited and the opening paper (to be given by the present writer) is to be illustrated with kinematograph films and with lantern views selected from photographs taken by various members of the party. In this way it is hoped that others who could not take part in the visit will be able to glean some useful information, while those who went will be able to discuss critically some more of the technical points in greater detail than time permitted during the actual trip. Mr. D. S. Munro is arranging for a similar meeting at the Scottish Centre, where he will read his notes on the visit and also exhibit the films.

The large number of visits which were made especially in the Pyrenees called for organisation of no mean order, and the Société Française des Electriciens must be highly congratulated on the success of the arrangements. The Presidents of both British and French Institutions, together with their wives, were indefatigable throughout the trip, and lastly, Mr. Rowell and Mr. Rayner deserve the thanks of every member for the immense amount of preliminary work which must have been necessary to ensure the comfort of everyone on what must always remain a most memorable and enjoyable trip.

The E.H.P. Conference at Paris.

A Review of the Proceedings.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

(*Continued from page* 1094.)

CONCURRENTLY with the conclusion of the Paris section of the I.E.E. summer meeting in France, the E.H.P. Conference concluded its deliberations, and forty of its members then took part in a similar trip to the Pyrenees as that of the I.E.E., though there was twelve hours difference.

One afternoon during the proceedings the members were received by the Lord Mayor of Paris and the Prefect of the Seine at the Hotel de Ville, where the guests were shown many art treasures that are not shown to the general public. One picture represented "Electricity," and the allegorical figure of a woman had at her side a very well executed Wimshurst machine.

At the closing session, summaries were made of the work accomplished in each of the three main sections by the chief reporters, Messrs. A. Roth, C. Duval and Parodi. It was decided to hold the next Conference in June, 1931, at Paris. Among the principal matters to be discussed then will be rules governing the construction of overhead lines; the possibility and utility of standardising poles; metal-clad switchgear; and protection against surges and overloads—the latter two subjects to be treated separately, as, of course, they are quite different. Dr. C. O. Mailloux put forward a proposal that the voltage of a line should always be given as that at the receiving end. This was supported by Mr. U. del Buono, and it was decided to draw the attention of all the National Committees of the I.E.C. to it.

All the Conference Committees previously appointed were re-appointed to further report at the next session, with the exception of the Committee on Statistics appointed in 1925. It was felt that the work with which this committee had been entrusted had come to an end, and any further work could be better accomplished by the Union International des Producteurs et Distributeurs d'Energie Electrique. Two new Committees were appointed, one to deal with insulators and the other with voltage surges. It was also decided to transmit to the I.E.C. the work of the Committee on Oil Switches.

In his concluding speech, Mr. Ulrich referred to the fact that at this Conference the attendance had been larger than ever before, that a larger number of countries were represented (totalling 33), and more papers had been presented, all of which augured well for the future. He specially thanked the authors of the papers, those gentlemen who had reported upon the papers, those who had acted as chairmen of the meetings, Mr. Tribot Laspière and his staff, and last, but not least, that friend of both languages, Mr. R. A. MacMahon.

Both space and time are limited, hence it will not be feasible to give more than a general summary of, and some of the comments on, the contents of the very large number of papers that were presented. It is hoped, however, to be able to give sufficient indication of the matters dealt with to facilitate reference by those who are more particularly interested to the original papers. After all, such a conference as this provides an excellent *résumé* of recent practice, and hence is of general interest.

Power Production and Transformation.

This section had as its general reporter Mr. Roth, while Mr. Gevaert (Belgium) took the chair for the first part of the proceedings. The power production portion covered papers dealing with the utilisation of fuel (C. O. Mailloux, U.S.A.); French practice in high-pressure and high-temperature steam (Dubertret); high-voltage alternator testing (E. Wilczek, special reporter); exchange of power between interconnected power stations (J. Reznicek); research on circuit breaking (E. B. Wedmore, W. B. Whitney and C. E. R. Bruce); and the "oil piston" theory for oil circuit breakers (J. Kepeliowitch).

From the first-named report it was of interest to note that now in the U.S.A. 88 per cent. of the output comes from stations with a capacity of over 100 million kWh per annum. While the production of electricity has increased by 12 per cent., the consumption of coal has decreased by 10 per cent. during the last two years.

Mr. Dubertret envisaged 450 deg. Cent. as the standard French steam pressure of the near future; there are many plants now working at 400 deg. C. They have not, however, adopted such high pressures as other countries, *i.e.*, pressures between 100 and 224 kg. per cm^2.

The standards of testing put forward by the authors of the papers dealing with alternators were severely criticised by Mr. B. L. Goodlet and others, as it was felt that, while the measurement of dielectric losses gave very interesting results, it could not be depended upon to divulge local faults, as was the case with a high-pressure test, notwithstanding the serious troubles that were sometimes caused by the latter practice.

The paper by Mr. Wedmore and his associates was based on a report presented to the I.E.E. in December, 1928, and hence further reference need not be made to it here. The conclusions drawn from the paper are that the problem of circuit-breaking is far more complicated than has generally been supposed, and that the breaking of a.c. circuits is mainly a problem of bringing about such conditions that the arc will not re-strike after current zero. It is mentioned that over 3,000 tests have been made, each involving from 50 to 100 items, and consuming over five miles of oscillograph records. Hence it will be appreciated that the matter has been investigated very thoroughly and carefully.

Mr. J. Kepeliowitch claims that the "oil piston" theory best explains the phenomena observed during tests with high rupturing capacities. The use of the kinematograph, taking slow-motion records at the rate of several hundreds of exposures per second, has made it possible to study the problem very much more closely, which means a step to further improvement in circuit-breaker design.

The second portion of this section dealt with transformer details; insulating materials; oils; and marks of quality. Mr. S. A. Stigant (Great Britain) acted as the special reporter for transformers, and his own paper dealt with the interturn insulation of h.p. and e.h.p. transformers, the results of an investigation by the B.E.A.M.A. Transformer Technical Committee. The general practice in England is outlined. Due consideration of the data now available permits the proportioning of transformer inter-turn insulation on more economical lines with greater strength, whereby the difficulty of withstanding the effects of the intense electromagnetic fields set up under short-circuit conditions is minimised. As is pretty obvious nowadays, it is pointed out that a sudden change of insulation at any one point tends towards a weak spot. Tables are given dealing

with the proposed proportioning and testing of inter-turn insulation.

Mr. P. Girault discussed the testing of three-phase transformers with earthed neutrals. Dielectric tests on such transformers can, of course, only be made with induced voltage, for which no National rules exist. He draws attention to the recent American practice of weakening the line insulators in the neighbourhood of transformer stations, so as to localise any damage from atmospheric disturbances, which are the chief source of trouble with transformers.

Mr. H. S. Holbrook dealt with the correlation of transformer insulation and line insulation. He pointed out that switching surges formed but a small proportion of the stresses to which a distribution system was subjected, and that lightning effects were very local. All transient pressures below flashover strength will enter the sub-stations and windings if proper precautions are not taken, such as a discharge gap at about 100 feet from the transformer. In discussing these papers, Mr. Marchand stated that he considered that Mr. Stigant's proposed tests were on the low side. Mr. W. Borgquist mentioned that in Sweden lightning arrestors had been dispensed with for the last 15 years, graded insulation being preferred.

The special reporter for insulating materials was Mr. J. Grosselin, who was also the chairman of the Conference Committee on the subject. The report of this Committee gave a simple general *résumé* of generally accepted test methods.

Mr. H. W. L. Bruckman dealt with special apparatus for testing the dielectric strength of insulating materials of the synthetic class. Mr. A. Smouroff pointed out that undoubtedly a magnetic field had some influence on dielectric losses, and he has carried out some preliminary experiments in order to test his theory.

Insulating oils were reported upon by a special committee, and its work was summarised by Messrs. H. Weiss and T. Salomon. The research work covered (*a*) laboratory work on the electrical properties of insulating oils, and (*b*) the deterioration of oils in service.

Mr. A. Smouroff described his work on the ageing of oils. Mr. T. N. Riley gave particulars of tests on the rate of change of power factor of heated oils. Mr. E. Masson gave a study of the relation between the resistivity, deterioration and the water content of oils, for which purpose he designed very simple apparatus, incorporating a Wimshurst machine, for rapid testing. The machine was placed in an enclosed chamber kept dry by quicklime, to ensure reliable working. Mr. Cassegrain reported his investigation of various national methods of testing the electric strength of oil with a view to suggesting international methods. Mr. J. E. T. Cogle gave an account of investigations carried out for B.E.A.M.A. on the effects on the electric strength of oil of the presence of certain impurities, finding that the greatest deterioration takes place when both water and impurities are present.

Mr. E. Pellissier dealt rather with operating features in the use of oils, particularly as to the effect of mixing oils of equal quality though of different brands. A time test on a number of small transformers is in progress over a number of years.

Mr. L. S. Ornstein gave an account of tests carried out on behalf of the Dutch central station engineers, dealing with dielectric losses, variation with temperature, electro-optical Kerr effect, the effect of the presence of sediments and oxidation.

This series of papers provoked a good discussion, which perhaps was not to be wondered at, seeing what a number of experts on the subject were present. Mr. H. Weiss pointed out that new and clean insulating oils were always quite satisfactory, but the presence of water, fibre, and dust deteriorated them. Filtering a used oil improved it, until such a time as it became oxydised. Mr. Moisson claimed that power-factor tests were more reliable as a measure of quality than breakdown tests. Mr. T. N. Riley remarked that the rate of deposition of sludge was not uniform, and also that changes in power factor coincided with alterations in the chemical composition. Mr. Krieger stated that if the temperature did not exceed 60 deg. C. it was quite feasible to filter out the carbon caused by arcing. Mr. A. Roth drew attention to the importance of being able to stock one kind of oil only for both transformers and switchgear. Above 45-60 kV, oils behaved differently in accordance with their quality.

The special reporter indicated that as regarded the future work of the committee it was proposed to continue the researches on variation in power factor, resistivity, dielectric strength and deterioration in service; also various practical questions, *e.g.*, deterioration in open-air stations, in idle transformers, the influence of materials used in transformer construction, deterioration of circuit-breaker oil, and the effect of frequent centrifuging.

A brief report was received from Mr. J. G. Bellar Spruyt, chairman of the Marks of Quality Committee, dealing with the proposed set of international rules for marks of quality; the work is to proceed.

This concluded the work of the first section of the Conference.

(*To be continued.*)

Do You Know?

The daily Press is playing so noble and educative a part by publishing stimulating questionnaires that it behoves us to study our coterie of readers.

By "STAN DARD."

THE following series of intimate and searching questions has been assembled with a view to its publication, accompanied by a cordial invitation to readers to answer them—if possible. Slide-rules are barred. No prizes are offered, for the thoughts generated should undoubtedly raise readers' personal load factors—with obvious advantages. It is hoped, however, that no cerebral overload will be experienced in certain quarters unused to peaks. Answers will be found on page LXV $\sqrt{3}$ $(\phi - a)$.

1. Describe briefly the different sections of the electrical and allied industries.
2. Which sort of putting-on tool is used for turbo rotors?
3. What are the statutory hours of a faultsman?
4. At how many readings are the pointers of a 5-dial meter register parallel to each other?
5. What happens to all the stamped, addressed envelopes sent by hopeful applicants to advertisers of jobs?
6. In which year (as originally announced by prophetic publicity agents and the guileless press) did television sets become available to "radio listeners in every home"?
7. Why are people agitating against a simple and harmless technical exactitude like the reactive kilo-volt-ampere hour?
8. Who was the originator of the word "juice"?
9. Why has d.c. juice only two colours while a.c. juice rivals the spectrum?
10. Is the aggregate capacity of a conference dinner determined by the number of plates? At which overload setting does a blow-out on the feeders ensue?
11. Explain the comparative rarity of old draughtsmen and meter testers.
12. Differentiate between "cross-talk" and "back-chat."
13. If a butcher served during the war as linesman in the Royal Engineers and then, after a period as wireless expert, joined a supply undertaking as photographer, what is his E.P.E.A. schedule grading?
14. When is a station "selected"?
15. Who and where runs the Parson's line?
16. Show how the phase colouring of the ELECTRICAL REVIEW cover has a *leading* significance.

Intermittent Illumination in Industry.

Some applications of synchronously intermittent light for the purpose of revealing moving machinery.

(Extracts from a lecture delivered before the ILLUMINATING ENGINEERING SOCIETY.)

THE annual general meeting of the Illuminating Engineering Society was held in London on June 4th under the chairmanship of Mr. Clifford C. Paterson, O.B.E. (president).

The 1931 Congress.

After some preliminary business had been transacted, the chairman said that a cause like that of illuminating engineering, or "good lighting," if it was to be strong and progressive, must have the effective support of all those influences which counted. Education, propaganda, research, standardisation, and engineering application must not be divorced from each other. The cause of good lighting could not move forward effectively if each organisation, or each man, felt that he had one of those spheres and one only. The only real method of co-ordination in human affairs was through the people themselves who were engaged in them, by the man who counted in each sphere having an effective share and substantial interest in the others. He wondered if it was realised how well founded was the illumination cause in Great Britain in respect of those considerations. The British National Illumination Committee rested equally on the three main Institutions of Gas, Electrical, and Illumination Engineers, supported by fifteen other influential bodies and Government Departments. That National Committee was also the Sectional Committee of the Engineering Standards Association, and represented the cause of illumination internationally. Then there was the Research Committee of the Department of Scientific and Industrial Research and the National Physical Laboratory, working in close collaboration, not merely together, but also with the bodies already mentioned. Finally, that machinery was strongly supported by the influential manufacturing and development concerns, both gas and electrical.

They had big preparations to make for the year 1931. The whole Council of the Illuminating Engineering Society had combined with the British National Committee to form a General Council for the 1931 Illumination Congress. That was to afford such an opportunity nationally and internationally as the Society had never had before to knit together all the influences in this country which could make for progress in good lighting.

The Lecture.

Dr. J. F. Crowley explained that in an endeavour to prove that motion did not exist, Zeno, pupil and friend of Parmenides, was responsible for the following, among other, paradoxes: "So long as anything is in one and the same space it is at rest. Hence, an arrow is at rest during every moment of its flight." That conclusion was scarcely acceptable to philosophy to-day, but the modern physicist would recognise a connection between the statement that "an arrow is at rest during every moment of its flight" and photographs taken 25 centuries later of bullets in flight, made by illuminating them for an instant by the light of an electric spark. If a body was in motion and illuminated for a sufficiently short period of time, it appeared to the eye to be at rest, and during the instant of illumination it could be photographed in its apparent state of rest, provided its position in space could be predetermined and that it could be illuminated with sufficient intensity for it to affect a photographic plate. Direct photographic registration might not be possible, however, if the velocity of the body was excessive, or if there was difficulty in sufficiently illuminating it during the short exposure. If the motion was periodic, or recurrent, then a photographic plate could, by means of suitable devices, be exposed at successive instants while the body was passing through the same space interval in the same direction, and the additive effect of the successive momentary exposures could be made to give the result of a prolonged continuous exposure.

The persistence of visual impressions could be employed to enable the eye to secure, in a manner somewhat analogous to that of the photographic plate, the effect of successive exposures to light from objects in true periodic motion. It could, in other words, be used to produce the appearance of objects being at rest which were rapidly moving, if the eye was given periodic "glimpses" of them of short duration. A second important application of the phenomenon also deserved mention, *viz.*, its employment for producing the appearance of motion of objects actually at rest, as in the case of the kinematograph.

Instruments that give the appearance of rest, or of slow motion, to bodies in rapid motion were termed "stroboscopes" and the first practical instrument of that type was produced by Plateau of Ghent (1801-1883).

On the one hand, since a stroboscope was required to produce a distinct image of the object viewed, the individual glimpses given by it must be very very short, and their shortness was only limited by the available intensity of illumination. In the case of the kinematograph, on the other hand, a comparatively long exposure for each individual photograph was necessary, so that the images of the rapidly-moving objects should not be sharp; otherwise, for an example, a man moving his right arm rapidly would appear to have two right arms in different positions, and the illusion of motion would be completely destroyed.

In over 100 different industries such instruments were in regular use. The textile industry was one in which the employment of stroboscopic apparatus was of particular value. A very large amount of experimental work had been done in various directions with a view to increasing the average speed of the spindle without excessive breakage of the yarn, and increasing the permissible maximum counts that could be spun on a ring-frame. With a view to avoiding variations in the tension of the yarn, owing to fluctuations in the speed of line shafting, individual electric drive has been introduced and, in addition, various variable speed electrical and mechanical drives had been employed automatically to regulate the spindle speed according to the position of the yarn on the cop. Amongst other experiments which had been carried out with a view of increasing the scope of the ring spinning frame, the employment of an individual drive for each spindle might be mentioned. In the case of a ring frame driven at constant speed the yarn was subjected to varying tension, and as the speed at which the frame could be run was determined by the maximum tension the yarn would stand, the speed must be such as to prevent that tension being exceeded at any moment; consequently, with a constant-speed drive considerable loss in production occurred. The trouble was well recognised, and numerous attempts had been made to meet it by mechanical means, but the only theoretically satisfactory solution so far had been the employment of an electrical drive, which gave, not only a low speed during the formation of the base, but also automatic variation of the speed during the cyclic movement of the ring tail. The advantage of being able to observe the shape of the "balloon" in the case of ring spinning had long been known, and a series of instantaneous photographs was taken in 1908 by Messrs. Brown, Boveri on which the calculations of the correct speed of the spindle for each position of the "build" was based; but the employment of a stroboscope as a means of studying the behaviour by viewing the "balloon" in its formation directly as though it were stationary was more readily carried out, and the results were more immediately available and more convincing than any series of photographs could be. Not only should a stroboscope be of advantage for experimental observation of the effects of fine adjustments, but it should also be of value in ordinary industrial mill practice for the maintenance of maximum efficiency and to the textile machinist in the design of various machines. In order that speed variations of an undesirable kind might be detected, it would be necessary for the stroboscope to be driven independently of the spinning-frame drive, and a separately-driven stroboscope, the speed of flashing of which could be varied readily as required, would probably be the most suitable type to employ.

Investigations conducted by Dr. Stevenson, of the British Research Association, for the woollen and worsted industries had successfully shown that bodies in periodic motion could be studied by means of intermittent light with great success. An instrument had been devised, which employed a rotating mirror, for the investigation of the behaviour of yarn in spinning machines and also the variation in speed of the spindles. The beam of light from an arc was deflected by the mirror so as to sweep the whole line of spindles with intermittent light. The spindles could be made to appear stationary, or as if moving slowly, and any defect in the winding of the yarn could be immediately effected.

Showing a series of seven slides of the Ashdown rotoscope, Dr. Crowley said three factors had to be borne in mind when using this instrument: (*a*) the size of aperture affected the amount of illumination; (*b*) the exposure affected the definition; and (*c*) the frequency of vision depended on the object viewed, a high frequency was required for a high speed. A new device, which Mr. Ashdown called the "heteroptic shutter," employed an outer cylinder that rotated much more rapidly than an inner (in the case of one instrument shown, at nine times its speed); if a suitable ratio existed between the two revolving shutters the frequency would be governed by the speed of the inner shutter and the exposure by the speed of the outer. This instrument was capable of measuring up to 40,000 revolutions per minute.

The inventor of the "Gnome" engine, Monsieur Seguin, and his brother, had brought out some very interesting apparatus. The "Stroborama Tele-tachymeter," type N, enabled the number of revolutions of any rotating mechanism

to be accurately measured and examined at a distance without any mechanical, or frictional, contact with the revolving parts. The rotating mechanism of which the speed was to be measured was lighted by a succession of practically instantaneous electric flashes; their frequency was so adjusted as to be in absolute, or approximate, synchronism with the mechanism examined, and thus the latter appeared to be at a standstill, or to revolve slowly if synchronism was not absolute.

In common with other stroboscopes, the "Stroborama" used flashes of light from a neon tube, but there all similarity between it and other stroboscopes definitely ended. The neon lamp of the "Stroborama" produced an illumination of 1,000 candle power; the lamp and its reflector were purposely constructed to diffuse the light evenly over a very large area. Not only did that prevent excessive shadows and approached normal daylight conditions, but large mechanisms, such as an entire engine, or an entire car, might be studied conveniently in any of their parts. In fact, the light was so powerful that it overcame the interference of daylight and artificial light and observations could be easily conducted without darkening the room. The invaluable feature of the apparatus was its independent synchroniser, which not only saved the lengthy and tedious labour of effecting connections with the mechanism to be observed, but also made it possible to show the mechanism both standing still and also with a continuous forward or backward movement at any desired speed. That often uncovered parasitic effects which it was otherwise impossible to detect, and any interesting portion of the motion that it was particularly desirable to study could be rocked to and fro; the experimenter could concentrate his observation on a specific amplitude of the motion, leaving his mind undisturbed by what might be taking place in other portions of the cycle. Another valuable feature was that when different parts of a mechanism were moving at different speeds, they could be brought to rest successively at a moment's notice. When parts running at erratic speeds were to be observed means were provided for the contact-breaker element of the synchroniser control to be removed for direct coupling to the object under investigation. When thus applied, a stationary image was produced, but different phases in the cycle of movement of the object could be investigated at will by partial rotation of the contact-breaker element, which could be effected when the object was running. This apparatus for the first time placed in the hands of the research worker an inexpensive, practical, accurate, and direct means of making an exact analysis of motion.

Dr. Crowley demonstrated his subject with the aid of a series of about thirty lantern slides illustrating various types of stroboscopic devices and practical demonstrations.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Electrical Review Index.

The Index to Vol. CIV (for the half-year ended June 30th, 1929) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

British Power and Light Corporation (1929), Ltd.

The British Power & Light Corporation (1929), Ltd., became officially established on July 1st, with its headquarters at Artillery House, Artillery Row, Victoria Street, S.W. Mr. H. A. Vernet is the chairman of the organisation, and Mr. G. V. Twiss its managing director. The Corporation controls the North Wales Power Co., the North Wales Distribution Co., and the West Hampshire, Ringwood, East Suffolk, Trent Valley, and South Somerset supply and distribution undertakings. On Friday last there was a dinner and foregathering of the personnel of the Corporation and its constituent companies at the Waldorf Hotel, London. The chairman, who presided, in proposing "The Constituent Companies," said that the new organisation had capital to the extent of £1,600,000 subscribed and paid up, £1,200,000 of which was in the North Wales concern. The area covered in North Wales was 4,000 sq. miles, with a population of 800,000. The total power available from the North Wales undertakings was 38,700 kW. The sales in 1928 amounted to 42 million units; 84 million units was the production capacity.

Brig.-Gen. R. F. Legge, C.B.E., D.S.O., in reply, said that electricity wanted just as much skilful salesmanship as any other commodity. He asked for the patience of the management for a few months, after which he was sure the objects of the concern would be achieved. All in the new organisation were happy over the choice of Mr. Twiss as managing director. There was loyalty throughout, with one main fundamental object—to sell electricity. There would no doubt be more companies in the concern in the course of time.

Mr. G. T. Garwood, B.Sc., proposed "The Corporation." He said that the work of the concern was to sell electricity in outlying districts. That was a vastly different proposition from selling it in large towns; but it would be achieved because perfect *esprit de corps* existed throughout the undertakings.

Mr. Twiss replied, and pointed out that the assets represented by the constituent companies were over £4,000,000. Over 5,000 sq. miles was covered, with a total population of 1,000,000. The Corporation was one of the five largest undertakings of its kind in Great Britain. He stressed the need for team work throughout the undertaking, and urged the superior officers to give their subordinates opportunity to show their worth.

A Works Visit.

Members of the Belsize Bradshaw Light Car Club, of Putney, were welcome visitors to the "Osram" glass works and research laboratories of the General Electric Co., Ltd., on June 15th. A tour of the various departments was made, and a number of demonstrations were given, including a complete model of the Great West Road with lighting to scale, together with an enlightening exposition of the way in which the refractors of Wembley street lighting lanterns bent the rays of light downward, so that they were directed on to the surface of the roadway.

The Contractor and the Architect.

It is realised by both the Electrical Contractors' Association and the National Register of Electrical Installation Contractors that a great amount of bad installation work could be avoided if architects, and others having the placing of electrical work, had greater knowledge of the factors involved. Unassisted by expert advice, the architect will favour the lowest tender for an installation contract without realising the implications of a very low price. In his annual report to the members of the Electrical Contractors' Association last week, Mr. W. H. Walton stated that the Association had produced a booklet upon the subject directed to architects, and prefaced by a commendation by the President of the Royal Institute of British Architects. We have now received a copy of this booklet, and find it to be of a very high standard. Its title is "Electrical Security: Installation Work, Good and Bad." An introduction states the arguments for good installation work which are, broadly, its convenience and its safety. The question of wiring systems is next discussed in general and non-technical terms, and some guidance to the choice of a system is given. The subjects of specifications and guarantees are dealt with in this section, and a model form of guarantee is reproduced. In the succeeding chapter the spirit of, and need for, the I.E.E. Regulations are demonstrated by showing point by point how an installation can be made cheap at the expense of reliability and safety. A few pages are devoted to the necessity for earthing, the matter being first simply explained. This section concludes with a warning regarding the added dangers which are introduced by the use of a.c. In the next chapter good and bad installations are contrasted. A small country house is taken as an example, and plans of the two floors are reproduced. Side by side two bills of quantity for lighting, heating and bells are set out to explain why good work necessarily costs more. The material cost for the correct installation is £81 10s., while that of the defective system is only £34. A few illustrated notes on the components of a wiring installation, their prices, and inadequate substitutes next appear, and there is a concluding chapter on use and maintenance. The last touches upon such matters as the use of the lampholder for heavy-current appliances, amateur

extensions, and the installation of electro-medical apparatus. The booklet is an admirable production, and our only criticism is that, if anything, the standard set is too high in a primer for architects. The contrast in the prices given in the sample bills of quantity may be too great for them to swallow, but if they strike a happy medium the work will not have been done entirely in vain.

Recent Contracts.

BRITISH INSULATED CABLES, LTD., has received orders for approximately 10 miles of h.p. cable for overseas, and 500 miles of steel-cored aluminium strand for use in the English "grid" schemes.

Horse Show Display.

At a horse show and parade of tradesmen's turnouts recently held in St. Helens, British Insulated Cables, Ltd., who had entered a pair of horses and a decorated wagon, obtained four first prizes and one second, as well as winning the Shire Horse Society's premium and silver medal.

New Steelworks in Chile.

The Chilean Executive has been authorised by Congress to invest 40,000,000 pesos (about £1,000,000), on account of the State Treasury, to finance the Compania Electro-Siderurgica de Valdivia. This company has been formed with a capital of 60,000,000 pesos to promote the local steel industry. It is proposed to install a large hydro-electric plant near Valdivia and a second electric foundry on the coast (modern electric steel furnaces are already installed at Corral, 11 miles from Valdivia). The combined production is expected to provide all the steel needed in the country. The principal source of iron ore will be the Tofo mines (Department of Coquimbo), belonging to the Bethlehem (Chile) Iron Mines Co., which produce well over 1,000,000 tons a year.—*Reuter's Trade Service* (Santiago).

Calendar.

We have received from the HARLAND ENGINEERING CO., LTD., 72-74, a calendar with changeable day and month cards bearing an illustration of the company's borehole pumps, together with a typically humorous conception by Mr. W. Heath Robinson of an early type of borehole pump for horticulturalists' water supply.

Catalogues Wanted.

Mr. J. T. LEACH, 46, Edith Road, Prittlewell, Essex, will shortly open premises at St. Mary's Lane, Upminster, as an electrical contractor's business, and will be glad to receive catalogues of electrical accessories at his present address.

The TEXTILE MACHINERY AND STORES CO., 67, Apollo Street, Fort, Bombay, also asks for catalogues, prices, &c.

Book Notices.

We have received a copy of the eighth edition of "Tait's Electrical Directory of Australia and New Zealand," published by the Tait Publishing Co. Pty., Ltd., of Melbourne and Sydney, which contains detailed particulars of all electricity supply undertakings in Australia and New Zealand. The undertakings are ranged in alphabetical order for Australia and New Zealand separately, and the information given includes name of supply authority, type and capacity of plant, voltage and system of supply, mileage of reticulation, number of consumers, population in supply area, prices charged, statistics of operation, and name of engineer. In addition, particulars and statistics are given of all electric tramway undertakings. A number of useful tables are included in the book. A complete list is given of the available water power in New Zealand, showing the present stage of development. The directory should be of great value to electrical engineers and to others engaged in the electrical trade. The published price is 7s. 6d., plus postage.

"*Statistik der Elektrizitätswerke und der Elektrischen Bahnen Osterreichs.*" Edited from the Elektrotechnischer Verein of Vienna. Pp. 188. Vienna: Elektrotechnik und Maschinenbau. —This is a new and enlarged edition of statistics relating to electricity undertakings and electric railways in Austria up to the end of 1927. The tables include generating statistics, plant capacity, consumers' voltages, &c., of some 815 power stations, and particulars of electric railways, giving mileage of tracks, working voltage, details of locomotives in use, &c. Reference is facilitated by the alphabetical arrangement of the stations under the provinces in which they are situated.

"Code for Protection Against Lightning." Department of Commerce, Bureau of Standards, No. 92. Pp. 114; figs. 3. U.S.A.: Government Printing Office, Washington. Price 25 cents.—This subject is of widespread interest and considerable importance. The scope of the code includes the protection of buildings, oil tanks, and other structures, trees, livestock, and persons; overhead electrical lines and apparatus connected thereto. The needs of both industry and the public have been kept in mind; whilst the standards set up largely represent American practice, foreign experience has also been given consideration. The subject matter is in five parts, three of which are presented in the present publication, the two parts dealing with electrical apparatus and lines having been withheld for further consideration. Each part consists of an introductory statement and the code, followed by an appendix in which the origin of lightning, its characteristics, and the effects it produces are discussed generally, an attempt being made to indicate how much (or shall we say little) is definitely known about the subject. That part of the code which deals with protective rod specifications sets forth in detail the practical requirements of good design. A bibliography is appended. Comments on the specifications and recommended changes are invited by the Committee from all who may have experience in applying them.

"Science Abstracts" (A & B). Vol. XXXII. Part 6. June 25th, 1929. London: E. & F. N. Spon, Ltd. Price 3s. each.

A Lamp Store Explosion.

An explosion of a large cylinder of carbonic acid gas took place recently at the back of the Cardiff offices of Tungsram Electric Lamp Works (Great Britain), Ltd., causing considerable damage to the doors and windows leading into the store room. The lamps which were stored in the affected premises proved, however, on test, to be none the worse for the explosion.

Unemployment.

An increase of 9,908 in the number of registered unemployed was shown for the week ended June 17th. At that date the total was 1,122,700, as compared with 1,112,792 on June 10th, and 1,162,521 on June 18th, 1928.

Bankruptcy Proceedings.

S. E. HUNT, electrical engineer and contractor, Torquay. This debtor appeared for his public examination at the Exeter Bankruptcy Court on June 27th. He said that he was adjudicated bankrupt on May 17th on his own petition. He realised that he was insolvent twelve months before, but he carried on in anticipation that a scheme framed by the Torquay Corporation would come to fruition. There were six local members of the Electrical Contractors' Association, and a proposal was made by the borough electrical engineer that a scheme of free wiring should be instituted, which would ensure to the six contractors at least a sufficient living without other business, and also that there should be a division of the profits from the sale of fittings at the new Corporation showrooms. The amount of the scheme was roughly £25,000 for the showrooms and the fittings alone, and it would probably have provided up to £250 a year for each contractor. The scheme, however, had been deferred. At a meeting of creditors in May the execution creditors would not withdraw the executions, and consequently he was advised by resolution to file his petition. Debtor stated that he was in business at Croydon from 1906 until 1925, when he removed to Torquay. He then had assets of £2,798 and debts of £2,000 approximately. The summary of his statement of affairs showed that he owed £1,998 to 105 unsecured creditors, £1,688 to three fully secured creditors and £363 to a creditor who had a security valued at £50—the lease of premises in Torwood Street. There were preferential liabilities amounting to £102, and the total expected to rank for dividend was £2,311. He estimated his assets to be worth £600, and after deducting the claims of the preferential creditors from this there was a deficiency of £1,813. Replying to the Official Receiver, debtor said there were 13 claims for loans and interest totalling £894. On one contract alone he lost £100. He had been constantly sued, and estimated that in the last twelve months law costs and costs of writs and summonses, &c., had amounted to not less than £226. The examination was adjourned until July 19th.

G. A. RANGER, trading as "Terminus Garage," and "G. Ranger," 1889, Forshore Road, King's Norton, Birmingham, cycle, motor-cycle and wireless dealer.—The public examination herein was held on June 26th, at the Court House, Corporation Street, Birmingham, when a statement of affairs was produced showing gross liabilities of £2,424, and there was a deficiency of £2,139. The debtor attributed his failure to insufficient capital, lack of experience, and loss on forced sale of stock. The debtor, it appeared, purchased the business at King's Norton in 1927, agreeing to pay £920, which price included £250 for goodwill. He had then a capital of £69, and borrowed from various sources £531. He paid £600 on account of the purchase of the business, and gave a promissory note for the balance, of which he still owed £140. He had had no previous experience, and since July last had been continually pressed by creditors. The examination was closed.

ERIC R. MILLWARD, trading as "West of England Radio," 67, High Street, Barnstaple, Devon, wireless engineer.—The following are creditors in this recent failure:—

	£		£
Rock, Mrs. E. M. ...	200	Empress Radio & Electrical Co.	37
Rolls-Caydon Sales ...	122	Sloan Electrical Co., Ltd.	90
General Electric Co., Ltd.	24	Central Garage	39
Houghton-Butcher, Ltd.	65	Spencer & Staddon ...	20
Cooke & Sons	25		

A. N. PENMAN, electrical engineer, 35, Ivanhoe Crescent, Wishaw, Lanarkshire.—Sequestration by the Sheriff of Lanarkshire on June 21st. A meeting to elect a trustee and commissioners was held on July 3rd at the Solicitors' Library, County Buildings, Hamilton.

H. J. HODDENOTT (Hoddenott & Co.), electrical fittings supplier, 3 and 5, Cathedral Yard, Manchester.—Trustee, Mr. F. Murgatroyd, Official Receiver, Byrom Street, Manchester, released June 12th.

W. T. LACEY, electrical engineer and contractor, 10, George Street, Bath.—Trustee, Mr. H. Ashton, Official Receiver, 26, Baldwin Street, Bristol, released June 10th.

H. WOOD, electrical and radio engineer, Market Place, Meltham, Huddersfield.—Trustee, Mr. J. O. Morris, Official Receiver, 12, Duke Street, Bradford, released June 10th.

A. L. WEEKES, electrical engineer, 13, Crescent Road, Luton.—Trustee, Mr. A. J. Rogers, Official Receiver, The Parade, Northampton, released June 14th.

C. AUSTIN (C. Austin & Co. & Austin's Accumulator and Radio Service), wireless accessories dealer, &c., 97, Domestic Street, Leeds.—Receiving order made June 24th, on debtor's own petition.

R. HILTON, electrical engineer, 81, Blackburn Street, Radcliffe, Lancs.—Trustee, Mr. S. A. Mayers, 16, Silverwell Street, Bolton, released May 13th.

W. ELLIOTT and P. ELAND (Burnley Armature Repairs), electrical engineers, 13, Cow Lane, Burnley.—Trustee, Mr. J. W. Carter, Official Receiver, District Bank Chambers, Blackburn, released June 17th.

Company Liquidations.

PERRING-THOMS WIRELESS SYNDICATE, LTD.—Winding up voluntarily. Liquidator, Mr. A. Williams, 82, Queen's Road, Brighton. A meeting of creditors is called for July 11th at 341, Salisbury House, London Wall, E.C.

COMMUNITY RADIO, LTD.—A meeting of creditors was held on June 26th at 9, Acresfield, Bolton. Particulars of claims to be sent to the liquidator, Mr. E. M. Haslam, 11, Chancery Lane, Bolton, forthwith.

SOUTH AMERICAN LIGHT & POWER CO., LTD.—A meeting of members is called for July 26th at River Plate House, Finsbury Circus, E.C., to hear an account of the winding up from the liquidator, Mr. C. H. Lambert.

EARLSDON RADIO SUPPLIES, LTD.—Winding up order made by the Nottingham Court on June 20th.

NEUTRON, LTD.—Liquidator, Mr. M. D. Booth, 40-43, Norfolk Street, W.C.2, released May 31st.

New Catalogues and Lists.

Messrs. A. P. LUNDBERG & SONS, LTD.—Leaflets E1.75, E1.76, and E1.77, describing, respectively, the makers' 4-pin plug connector, "wireless" turn-button switches, and multiple master-control switch for aeroplanes, motor boats, &c.

Messrs. HEYES & Co., LTD., Wigan.—Illustrated pamphlet, "Finnish Finish," relating to "Wigan" prismatic bulkhead fittings supplied to the authorities of the Finnish State Archives.

Messrs. FALK, STADELMANN & Co., LTD., 83 to 93, Farringdon Road, E.C.1.—Pamphlet No. P.1332, concerning "Nova" switches. Priced and illustrated.

THE FIRE FOE CO., King Street, Bury, Lancs.—Catalogues and lists describing "Fire Foe" and "Hujo" appliances.

Messrs. COLEY & SWINNERTON, LTD., Bon Accord Works, St. John's Square, Wolverhampton.—Leaflet No. 29, illustrated and priced, showing the "Savex Dominion" and "Electric Perfection" cookers.

CROMPTON PARKINSON, LTD., Bush House, Aldwych, W.C.—A booklet issued in connection with the inauguration of two auto-synchronous motor generating sets with automatic power factor correction at Ilford Corporation sub-stations, and containing notes on automatic correction of power factor. Illustrated.

MESSRS. S. G. BROWN, LTD., Western Avenue, North Acton, W.—The July issue of the "Brown Marine Gazette" contains a number of interesting items, including articles by Prof. H. H. Turner and the late Prof. J. Perry, and notes on the company's activities.

MESSRS. FERRANTI, LTD., Hollinwood, Lancs.—Charts Nos. 1 and 2, giving full details for the construction of high-grade h.t. supply units, using respectively a full-wave metal rectifier and a full-wave valve rectifier.

BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester.—A well produced and illustrated brochure showing apparatus exhibited on various stands at the recent Printing Exhibition at Olympia for which the company's control gear was employed. Also Booklet No. 291, dealing with the "Electrical Control of Woodworking Machinery." Illustrated.

MR. O. N. BECK, 11, Queen Victoria Street, E.C.—A leaflet drawing attention to the "Record" belt shifter for cone pulleys.

MESSRS. JOHN THOMPSON WATER-TUBE BOILERS, LTD., Imperial House, Kingsway, W.C.—A brochure entitled "The Agecroft Power Station of the Salford Corporation," giving particulars of plant installed, including the company's water-tube boilers, &c.

MESSRS. J. A. CRABTREE & Co., LTD., Lincoln Works, Walsall.—An illustrated and priced folder advertising "Jacelite" moulded lampholders.

Messrs. SIEMENS BROTHERS & Co., LTD., Woolwich, S.E.—Pamphlet 500A, giving a list of public and private automatic exchanges installed by the company in the British Isles, Dominions, and foreign countries, with illustrations of some of the installations.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Catalogue No. P. 247 of Prescot paper pinions, including tables of circular and diametral pitch.

Messrs. HENRY WALLWORK & Co., LTD., Manchester.—Leaflets No. 69 and 69a, drawing attention to enclosed double-reduction helical gears.

MESSRS. E. P. ALLAM & Co., LTD., 107-109, Gray's Inn Road, W.C.—Stock list No. 46 of d.c. motors for sale, hire or hire-purchase.

INSULATORS, LTD., Derby Road Works, Montague Road, Edmonton, N.—Leaflet No. 101, drawing attention to the company's Bakelite mouldings.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—A leaflet advertising the company's motors.

THOR LAMPS & SUPPLIES, LTD., Tredegar Street, Cardiff.—Leaflet LI/429, depicting "N.P.E." and "P.E.B." "Thor" safety lamps; Leaflets SLI/629, describing "S" and "SP" "Thor" miners' electric safety lamps; and a leaflet dealing with the company's latest design of charging stand. All illustrated.

LANDIS & GYR, LTD., Elgee Works, Victoria Road, North Actn. W.—A booklet showing how time and money can be saved in offices and works by using the "Inducta" staff-locator.

Local Exhibition.

With the object of showing the economical use of electricity and labour saving in household use, and for agricultural and manufacturing purposes, the Shropshire, Worcestershire and Staffordshire Electric Power Co. held an exhibition from June 25th to 28th on the green adjoining the Crown Hotel, Astwood Bank.

For Sale.

Worthing Corporation invite offers for the purchase and removal of a d.c. generating set and three ejector condensers, with a quantity of exhaust piping and valves. (See our advertisement pages to-day.)

Trade Announcements.

The address of the NORTH WALES POWER CO., LTD., the POWER DEVELOPMENT CO., LTD., and Messrs. G. V. TWISS AND PARTNERS, as from July 1st, is Artillery House, Victoria Street, S.W.1.

Mr. F. H. JACKSON has been engaged by Messrs. POOLEY AND AUSTIN to deal with the sales of Messrs. Drake & Gorham's "Metesco" and other switchgear, and the "Lawson" mercury motor meter manufactured by Messrs. Fox & Offord, Ltd., for both of which the firm holds the sole agencies for London and the South of England.

The WHOLESALE ELECTRIC LAMP CO., LTD., 37, Vauxhall Bridge Road, S.W.1, has been appointed wholesale distributor of "Koda" sac and dry cells. Leaflets dealing with these have been received.

Messrs. JOHN SHAW & SONS, WOLVERHAMPTON, LTD., state that the telephone number of their London electrical showroom (29-30, Shoe Lane, E.C.4) has been changed to "Central 2163."

The London offices and stores of the CONCORDIA ELECTRIC WIRE CO., LTD., are now at 81, Milton Street, Sydney Avenue, E.C.2. (Telephone: Metropolitan 9780.)

TUNGSRAM ELECTRIC LAMP WORKS (GREAT BRITAIN), LTD., has appointed Mr. C. H. Blackburn, late of the General Electric Co., Ltd., provincial sales manager for the Midlands and the North of England. The branches included are Manchester, Birmingham, Newcastle, Leeds, and Nottingham. Mr. Blackburn is a member of the Wembley Urban District Council. Mr. W. H. Stone, for some years manager of the company's Cardiff branch, has been appointed provincial sales manager for the South-West of England and South Wales.

The Royal Metal Trades Pension and Benevolent Society.

The Board of Management of this Society has issued a circular to subscribers announcing its decision to admit to the pension all accepted candidates, who will thus be saved the expense and anxiety attendant upon a contested election. An appeal is made to subscribers to obtain new members.

The I.E.E. Model Contract Conditions.

Users of the Institution's model forms of General Conditions for Contracts are reminded that revised editions have been issued as follows:—Form A (home, with erection), April, 1929; Form B1 (exports, delivery f.o.b.), December, 1928; Form B2 (export, including erection or supervision of erection), December, 1928. In addition, there are available:—Form C (sale of goods other than cables—home, without erection), issued April, 1924; Form D (sale of cables—home, without erection), issued April, 1924.

A New Electric Oven.

In the notice of the new Model 124 electric oven of the ARORA CO., on p. 1167 of our last issue, we stated that the accompanying illustration showed the oven on a 15-in. stand. The height of the stand illustrated is actually 2 ft. 6 in., but the company also supplies a stand 15 in. in height.

The Patents Committee.

The *Board of Trade Journal* says that the Patents Committee, under the chairmanship of Sir Charles Sargant, has begun its investigations, and persons and associations who wish to submit suggestions or to give evidence should communicate with the Secretary, Mr. R. W. Luce, Industrial Property Department, Board of Trade, 25, Southampton Buildings, W.C.2. The Committee was appointed by the Board of Trade to report whether any amendments in the Patents and Designs Acts, or changes in the practice of the Patent Office, are desirable.

Marconi Radio Royalties.

The present position with regard to Marconi radio patent royalties, consequent upon Mr. Justice Luxmoore's recent decision, is outlined in a letter sent to the members of the Radio Manufacturers' Association. According to the *Wireless and Gramophone Trader*, this stated that in the course of an interview with Mr. F. G. Kellaway, managing director of the Marconi Co., a deputation from the R.M.A. was assured that the company had no desire to take a narrow view of its victory in the Law Courts, provided a reasonable arrangement could be arrived at. The company had agreed to stay for one month proceedings under any legal action instituted for the recovery of the difference in the fixed and proposed royalties and to defer for a like period the demand for the payment of that difference. Mr. Kellaway agreed to recommend to his board that, in the event of the negotiations reaching a satisfactory conclusion, the scale of royalty as then fixed should be operative from August 28th, 1928.

Social Events.

The annual outing of the employés of Messrs. Ernest F. Moy, Ltd., was held recently at Clacton-on-Sea. Dinner was served at the Royal Hotel, when a vote of thanks was accorded to the manager.

On the occasion of the annual picnic of the employés and staff of the Warrington Corporation electricity works, fishing and bowling competitions were held, the venue of the outing being Helsby where the visitors had the permission of British Insulated Cables, Ltd., to use their bowling green and fish pond.

The employés of Messrs. Trevelyans (Birmingham), Ltd., held their annual outing on June 22nd, at Blackpool, and were entertained to tea by the directors of the company.

The annual sports of Messrs. J. G. Statter & Co. were held on June 15th in the grounds of Major Marston. Mrs. Marston distributed the prizes.

The annual outing of the head office staff of Messrs. John Shaw & Sons, Wolverhampton, Ltd., took place on June 15th, at Llandudno. The journey was made by motor coach, and on arrival the party was entertained to lunch, during which Mr. V. A. Mattick, general manager, extended a welcome to the staff. For the remainder of the day the employés followed their own inclinations, the return journey being made at a late hour.

The head office and warehouse staff of Messrs. Falk, Stadelmann & Co., Ltd., held their annual outing on June 22nd. The party, numbering about 360, was conveyed by special train to Southend-on-Sea, where lunch was taken at the Palace Hotel, the chairman of the company, Mr. Max Falk, presiding.

Prices of Materials.

In their letter dated June 29th, Messrs. James Forster & Co. stated that there is no fresh feature in the lead market to report. Owing to the smaller arrivals during the month there is a shortage of prompt lead and in some cases consumers have had to pay a premium to obtain warehouse lead in order to keep their works going. Arrivals, however, promise to be pretty full during July so that the present tightness is likely to be only temporary. Demand from home consumers has quietened down again, while the Continent shows little interest, and this condition of affairs seems likely to continue. There does not therefore appear to be much prospect of higher prices in the near future.

Messrs. F. Smith & Co. report, July 2nd: Copper (electrolytic) bars, £84 10s., 5s. dec.; ditto ditto sheets, no change; ditto ditto wire rods, £94 10s., 5s. dec.; ditto ditto h.c. wire, 11§d., 1/16d. dec.

Messrs. James & Shakespeare report, July 2nd: No change in the prices of copper bars (best selected), sheet and rod; English pig lead, £24 15s., 10s. dec.

Messrs. Edward Till & Co. report, July 2nd: India-rubber, Para fine, 11½d., ¼d. inc.

Lighting and Power Notes.

Barking.—Wiring Scheme.—The Urban District Council Electricity Committee recommends the adoption of the scheme of the Fixed Price Light Co., Ltd., for wiring and lighting small houses in selected areas of the town at a fixed price per lamp per week, the company taking a bulk supply from the Council at £5 5s. per kW connected, plus 0.8d. per kWh.

Bexhill.—Public Lighting.—The Town Council has decided that as from the commencement of the current financial year, the charge made against the Highways Committee in respect of public lighting shall be decreased by 25 per cent. This will mean a reduction of approximately £1,000 per annum.

Bootle.—Special Order.—The Cumberland Waste Heat Owners Co., Ltd., has informed the Rural District Council of its intention to apply for an Order to supply electricity to Seascale.

Canada.—Electrical Development.—The Shawinigan Water and Power Co. has taken the first step towards the great power development on the upper St. Maurice River authorised by the Quebec Government last year. It is constructing a transmission line from Shawinigan Falls to La Tuque which will ultimately be continued to connect with the first section of the scheme built on the St. Maurice. The line will at first supply power to La Tuque, where the Brown Corporation has contracted for a maximum of 15,000 h.p. Surveys are being actively carried on to determine the sites on which the company will erect its power plants on the St. Maurice River. The additional supply of power which the Shawinigan Co. can secure from this development is estimated at 600,000 h.p.

Chelmsford.—Proposed Change-over.—At a meeting of the Corporation Electricity Committee held recently it was reported that the Electric Supply Corporation, Ltd., had provisionally agreed to terms for a supply of electricity in bulk to be obtained from the County of London Electric Supply Company, and that it had made application to the Central Electricity Board for a contribution towards the cost of changing the frequency of the system of supply at Chelmsford, but without success. The Committee recommended approval of the suggestion that the company should carry out the conversion from 100 to 50 cycles at its own cost. It was further decided to ask the company, pending the conversion, to consider reducing the price at present charged for power purposes.

Cheltenham.—Loan.—The Corporation Electricity Committee is seeking sanction to the borrowing of £10,000 for mains and services.

Additional Supply Lines.—At a recent meeting of the Corporation Electricity Committee the borough electrical engineer submitted a letter from the local power company stating that the construction of the overhead 11,000-V transmission line between Beckford and Evesham was now well in hand and the route for the additional line from Hesters Way sub-station to the line supplying Evesham was being surveyed, the company anticipating the completion of a duplicate route by September. In view of this position the Committee recommended a change-over of a further section of consumers in Leckhampton and Charlton Kings districts.

Colchester.—Bulk Supply.—At a meeting of the Corporation Electricity Committee held recently a letter was received from the Walton-on-the-Naze Urban District Council intimating that the Council was prepared to accept the terms submitted for a bulk supply. The town clerk was asked to reply that the suggested provision that the Walton Council should not charge its consumers prices lower than those charged by the Colchester Corporation in areas adjoining Walton urban district would be waived, but that the Corporation was unable to undertake that a supply would be available not later than October 31st next.

Continental.—Switzerland.—The Cantonal authorities of Zurich, Schwyz and Zug, have given their approval to a project of the Swiss Federal Railway authorities to establish a hydro-electric power station, to be known as the Etzel, to utilise the power of the River Sihl. The plans for the station are based on an initial installation of 33,000 h.p. with an ultimate capacity of 120,000 h.p.

Sweden.—A new hydro-electric power plant, which will add 30,000 h.p. to Sweden's electrical energy resources, is being jointly constructed by the Avesta Iron Works and the Alby Nya Kloratfabriks Aktiebolag, who will share the power generated. The Alby Chlorate Works belong to the Kreuger concern and furnish the Swedish Match Company with chemicals. The Kreuger and Toll Co. will build the new station, which will utilise the powerful Storforsen Falls in the Dalelven river.

Glasgow.—Progress During May.—Under the Corporation Electricity Department's scheme 822 houses were wired in May, making the total to date 14,455. Hired appliances installed during May numbered 35, making the total 18,548.

Mains Extensions.—The Corporation Electricity Committee, at its last meeting, recommended that distributing mains be laid at a cost of £7,998.

Godstone.—Overhead Lines.—The Bletchingley and Godstone Parish Councils have requested the Rural District Council to oppose any application made by the Urban Electric Supply Co., Ltd., for the erection of overhead lines for a supply of electricity. The Council has decided to object to the use of overhead lines by the Sevenoaks and District Electricity Co. at Oxted on the ground that there is no room in the highway for the purpose and that overhead lines would destroy the amenities of the neighbourhood. The Council also contends that there is no justification for the use of overhead lines, having regard to the profit made by the company, and intimates that it will approach an estate company with a view to obtaining a free wayleave for underground mains.

Guildford.—Loans.—The Corporation Electricity Committee has obtained sanction to loans of £516 for mains, £6,047 for plant, and £1,938 for sub-station buildings. The Committee has also applied for sanction to loans of £1,000 for public lamps and £2,000 for meters.

Proposed New Cable.—At a recent meeting of the Corporation Electricity Committee the borough electrical engineer reported that, in order to give a supply of electricity to Gooserye, Worplesdon, it would be necessary to lay a new cable, &c., at a cost of £3,414. He was asked to obtain

particulars as to the estimated return from this extension, and, subject to the report being satisfactory, to have the work put in hand.

ELECTRICITY SUPPLY.—The Corporation Electricity Committee has asked the sub-committee to consider the request from the electrical engineer of Dorking for a supply of electricity to residents of Abinger Hammer and district, outside the Corporation's area of supply.

Hambledon.—AMENDED TRANSMISSION LINE PLANS.—The Rural District Council has approved amended plans submitted by the Aldershot Gas, Water, and District Lighting Co. for a transmission line from Farnborough to Hindhead. The line will be partly overhead, and partly underground, and on the amended route will not be visible from the Devil's Punch Bowl, and thus will not mar the view. In consequence the Council has intimated that it does not wish to be heard by the Minister of Transport.

Herne Bay.—FLOODLIGHTING.—The Urban District Council is considering the desirability of recommending a scheme for floodlighting the Council's pier pavilion and King's Hall.

Ilford.—SPECIAL ORDER.—The Corporation Electricity Committee has obtained an Order to supply electricity to certain premises in the rural district of Epping.

Irish Free State.—DUNGARVAN.—At a special meeting of the shareholders of the Dungarvan electricity undertaking, held recently, the offer made by the Electricity Supply Board for the purchase of the undertaking was discussed. The Supply Board had offered £5,000 for the undertaking, but as a result of a deputation from Dungarvan, the offer was increased to £5,800. It was unanimously decided to accept the offer of the board in spite of the fact that a loss of 6s. in the £ would be incurred by the shareholders.

Kingston-on-Thames.—LOAN.—The Town Council has applied for a sanction to a loan of £43,762 for extensions of plant at the electricity works.

Lancaster.—YEAR'S WORKING.—The accounts of the working of the electricity department (engineer: Geo. C. Milnes) show a total revenue of £39,436 and working expenses of £27,214, leaving a gross profit of £12,233. To this sum were added various contributions to loan charges totalling £7,029, making £19,252 available. After deducting capital and income-tax charges there was a net surplus of £1,526. The capital expenditure during the year amounted to £43,824, and included £20,226 for machinery and £19,133 for mains. The sales of electrical energy (including the supply to Morecambe) totalled 6,563,851 kWh.

Leicester.—PLANT INSTALLATION.—The Corporation Health Committee has reconsidered the question of the installation of electrical plant at the Isolation Hospital and Sanatorium. The Committee met a deputation of the Electricity Committee and fully discussed the question of cost, &c., but was definitely informed that to meet the requirements it was impossible to obtain a supply of electricity at a lower cost than that prevailing at present. The Committee proposes, therefore, to install two 75-kW generating sets, together with the necessary switchgear, &c., at an estimated cost of £1,982.

Leigh (Lancs.).—YEAR'S WORKING.—The accounts of the working of the Corporation electricity undertaking (engineer: Mr. J. B. Hudson) for the year ended March 31st last record a total income of £54,275, as against £51,485 in the previous year. Working expenses totalled £35,728, as compared with £29,560, leaving a gross profit of £18,547 (£21,925). Capital charges absorbed £14,475 and capital expenditure provided out of revenue a further £1,590, leaving a net surplus of £2,481, as against £9,447 in 1927-28. The sales of electricity rose from 8,454,911 to 9,559,720 kWh, and the maximum supply demanded from 4,476 to 4,770 kW. The average price obtained per kWh fell from 1.37d. to 1.20d. A reduction in the charges for electricity was made in July last.

Maidstone.—LOAN.—The Town Council has applied for sanction to a loan of £11,683 for the purpose of supplying electricity to the Malling district. This sum includes £1,850 for an overhead transmission line, underground cable, transformers and switchgear to the cold storage research station, £9,333 for a similar purpose from the research station to the village of West Malling, and £500 for the conversion to electricity of 70 street lamps at West Malling.

Nottingham.—YEAR'S WORKING.—The annual report of the Corporation Electricity Committee states that the sales of electricity during the past year have been greater than in any previous period since the supply was inaugurated. The committee states, however, that despite a decrease in the working costs, there is a smaller balance, due to an increase in income tax and capital charges and to the fact that the last reduction in prices had been in operation for the whole of the year, compared with six months only covered by the period of the previous report. The assisted wiring scheme for small houses was commenced during the quarter ended December last and 57 houses had been connected up to March. The total sales of electricity amounted to 43,564,607 kWh, an increase of 6,111,399 kWh. The average price obtained per kWh was 1.88d. as compared with 2.05d. in 1927-28. The total revenue was £223,106 and the expenditure £194,691, the balance of £28,415 being appropriated as follows: Contribution in aid of the general district rate, £23,170; amount transferred to reserve fund, £5,245.

Preston.—EXTENSION OF SUPPLY AREA.—To provide a supply of electricity to the Wrea Green district, the Electricity Committee has decided to erect a 6,600-V overhead main from Hall Cross to Wrea Green, with a sub-station at Wrea Green, at a cost of £5,820. Application is to be made for sanction to a loan of this amount.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

FAVERSHAM.—Lighting: From 8d. to 7d. per kWh. Power: A rebate of 5 per cent. on quarterly accounts of £1 and over.

STOKE-ON-TRENT.—Lighting: From 7d. to 5d. per kWh. Heating and cooking: From 1½d. to 1d. per kWh. Multi-part tariff: Fixed quarterly charge of 5s. per room remains unchanged. Consumption charge reduced from 1d. per kWh for first 240 kWh, ¾d. for second 240, ½d. for third 240, and ⅜d. for all energy in excess of 720 kWh per quarter to 1d. per kWh for first 240 kWh and ¾d. in excess of 240 kWh. Other concessions have been made to large users.

SHIPLEY.—Flat rate charge for lighting: From 6d. to 5½d. per kWh. Flat rate charge for power and heating: From 2d. to 1½d. per kWh.

Rotherham.—YEAR'S WORKING.—We have received from Mr. Edward Cross, engineer and general manager of the Corporation Electricity Supply Department, a copy of his report on the working of the undertaking for the year ended March 31st last. The total revenue amounted to £252,976, and working expenditure was £119,492, leaving a gross profit of £133,484. The figures for the preceding year were: Income, £239,140; working expenses, £113,031; gross profit, £126,109. After providing for capital charges, &c., there was a net surplus of £30,322, as compared with £34,705 in 1927-28. The sales of electricity increased from 63,561,013 to 80,258,345 kWh, but the revenue per kWh fell from 0.903d. to 0.75d. The interlinking arrangement with Sheffield was put into operation on February 18th last, and the bulk supply to Sheffield will be continued as agreed for a period of five years.

Southend-on-Sea.—LOANS.—The Town Council has applied for sanction to loans of £66,000 for the installation of three 1,200-kW land-type Diesel-driven generators with accessories, and of £6,645 for the installation of a 1,500-kW convertor.

Special Orders.—The Chudleigh Light and Power Co., Ltd., has applied to the Electricity Commissioners for a Special Order to extend its area of supply, so as to include certain parishes in the rural district of Saint Thomas.

The Torquay Corporation has applied to the Electricity Commissioners to amend the Torquay Electricity (Extension No. 2) Special Order so as to include in the proposed area of supply the parish of Widecombe-in-the-Moor. The Farnham Gas and Electricity Co. has applied to the Electricity Commissioners for a Special Order authorising the raising of additional capital for the electricity undertaking.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the Warwickshire Electric Power Co. to increase its capital and borrowing powers and the Central Sussex Electricity, Ltd., to extend its area of supply so as to include parts of the rural districts of Cuckfield and Chaley.

Stoke-on-Trent.—LOAN SANCTIONED.—At a recent meeting of the Corporation Hospitals Committee, the town clerk reported that sanction had been received to a loan of £1,000 in connection with the supply and erection of electric lighting plant at Stallington Hall, on the understanding that if and when a public supply of electricity became available in the vicinity of the institution the plant would be sold and the proceeds of its sale applied towards the reduction of the loan.

York.—LOANS.—The Corporation Electricity Committee is to apply for sanction to loans of £10,000 for the purchase of domestic appliances and £2,000 for assisted wiring.

Tramway and Railway Notes.

Canada.—MONTREAL.—The Canadian House of Commons recently voted a sum of $50,000,000 to be spent by the Canadian National Railways on a complete reconstruction of its terminal facilities at Montreal. The new central station of the system in the city will be underground, and no steam engines will be permitted to enter, the lines in the city limits being completely electrified. When this new railway station has been constructed it will accommodate 95 per cent. of all of the Canadian National passenger trains entering or leaving the city, and the remaining 5 per cent. will be able to use the station as soon as the necessary entrance facilities can be provided. The new terminus will be erected on the site of the existing "Tunnel Station," the terminus of the former Canadian Northern line constructed under Mount Royal. It will be linked up by a new viaduct with the Victoria Bridge over the St. Lawrence River, thus permitting passenger trains from the south to reach the central stations. These trains formerly used Bonaventure Station, which is now to be used entirely for freight traffic; the new route will be two miles shorter than the existing line to Bonaventure Station. The estimated cost of the new terminus is $51,409,000.

Dudley.—TRAMWAY ABANDONMENT.—The Streets and Tramways Committee has entered into an agreement, subject to the ratification of the Town Council, for the abandonment of the tramway service. The system is owned by the Corporation, but has been leased to the Dudley and Stourbridge Electric Traction Co., the lease expiring in 1938. Under the terms of the proposed agreement the Corporation is to receive from the Midland Red Omnibus Co. the annual amount paid by the tramway company under the lease, and is to enter into an arrangement for the division of profits on 'buses running through the town. The tramway company is to pay the Corporation £12,000 towards the cost of removing the track, the Corporation to receive the profits obtained by the disposal of the rolling stock.

Ilford.—NEW TRAMWAY LEASE.—The Corporation Tramways Committee has recommended a new lease with the Barking Urban District Council in respect of the section of tramway from Loxford Bridge to the "Bull Hotel," Barking. The general principles have been agreed upon by the representatives of the two Councils. The period of the lease is to be twenty years, the Barking Council to reconstruct the whole of the section of track at an estimated cost of £16,700. The rental to be paid by the Council under the new lease is to be an amount equal to the annual interest and repayment in respect of the loan for the reconstruction of the track, plus a sum of £659 per annum.

Jarrow.—TRAMWAY ABANDONMENT.—The Jarrow and District electric tramway service ceased to operate on June 30th last and motor 'buses have been introduced. The Corporations of Jarrow and South Shields have taken over the tramway track and have come to an arrangement with the tramway company for the remaking of the roads.

Lancaster.—TRAMWAY ABANDONMENT.—The Town Council, on June 26th, decided to abandon the electric trams which have been running 26 years, and substitute a system of 'buses. The deficit on the trams last year was £1,344, and on 'buses £1,736.

Liverpool.—EXTENSION OF TIME.—The Corporation has intimated its intention of applying to the Minister of Transport for a prolongation of the time limited for the commencement or completion of various sections of its tramway system.

London.—UNDERGROUND STATION RECONSTRUCTION.—Work is shortly to commence upon the reconstruction of the booking hall at London Bridge Underground station. The existing booking office will be converted into a clerks' room and cloakroom, and a passimeter booking booth installed to take its place. The two lifts will be controlled from inside the booking booth, the controls being placed within easy reach of the booking clerk's counter, the system being identical with that in force at the subway entrance at London Bridge station and also at Angel, King's Cross, Kennington and Baker Street stations.

NEW ROLLING STOCK.—The withdrawal of the original type of tube car, with hand operated gates, and the substitution of modern cars with air-worked doors is taking place on the Piccadilly line. Although this line is the third of the lines to be fully equipped with new cars, it was the pioneer in the matter of pneumatically-operated doors. The first of the new trains was introduced in March last; sixteen are now in service and the change will be completed this week-end. The last line to be dealt with will be the Bakerloo and it is anticipated that the conversion of the local trains on that line to the new type will be completed by December. The whole of the tube lines will then have been completely changed from old to new stock, 1,343 cars of the new type having been put into service at a cost of approximately £2,225,000. On the District Railway, also, new cars of improved pattern are being put into service, together with reconditioned cars, at the rate of a train a week. The whole of the main line service will comprise new and converted cars early next year.

Manchester.—MOTOR-OMNIBUSES.—The Manchester correspondent of *The Times* reports that a proposed expenditure of £110,000 on 60 new double-decked motor-omnibuses, to take the place of tramcars on a circular route of 8½ miles between the northern and southern suburbs was to be considered by the City Council on Wednesday last. The proposal emanates from the new tramway manager (Mr. R. Stuart Pilcher), and is supported by the Tramways Committee. Mr. Pilcher foreshadows similar substitutions on other routes of a secondary character that are relatively unremunerative or unusually costly to operate. It is pointed out that the discontinuance of electric overhead traction would relieve the Tramways Committee of its obligation to contribute one-half of the cost of necessary street improvements on tramway routes, and of much expense in the maintenance of road surfaces, and the only off-set would be the cost of removing rails and overhead equipment once the change to motor-omnibuses had been decided on. The omnibuses which it is proposed to introduce will each hold 57 passengers, and will run on pneumatic tires. The estimated cost of each is £1,750. The 60 omnibuses will have to undertake an initial annual mileage of 1,660,000 miles on the circular route to be operated first, and it is suggested that this should almost immediately be extended, as the traffic is constantly increasing, and fresh districts could be served at both extremities of the route.

Nottingham.—YEAR'S WORKING.—The annual report of the Corporation Passenger Transport Committee shows that the receipts during the past year from the city's transport undertaking totalled £480,968. Working expenses amounted to £377,900, leaving a balance of £103,068, to which was added £1,489, being the amount transferred from the sinking fund representing interest on investments not required, making a total of £104,558, of which £24,450 has been allocated to rate relief, the remainder being devoted to interest and sinking and renewal funds.

Telegraph and Telephone Notes.

International Telephony.—NEW CABLE PROJECTED.—A proposal to lay a new submarine cable across the Channel to augment the telephone facilities between Great Britain and France is under consideration by the two countries.

The Telephone Service.—ISLE OF MAN.—The trunk telephone system of Great Britain was extended to the Isle of Man at 1 p.m. on June 28th.

The Vatican City.—AUTOMATIC TELEPHONY.—According to cable advice received in New York by the International Telephone and Telegraph Corporation, the Vatican authorities have decided to equip the whole of the Vatican City in Rome with an automatic telephone system. The International Standard Electric Corporation is to install it as soon as possible and the equipment will link the recently created State by international telephone lines with all countries of the civilised world, which means that at some future date some 33,000,000 telephones will be placed in direct connection with the Holy See. The Vatican City's automatic exchange will have a total capacity of 1,800 lines, but will be equipped at present with about 500 numbers. Service with the outside world will be partly automatic and partly through a manual board equipped with about 30 circuits connected with the regular Italian lines. The installation of cables will require considerable ingenuity to prevent damage to the expensive decorations and valuable works of art which cover almost every part of the buildings in Vatican City; incidentally, some of the walls through which the telephone wires are to be run are about 15 feet thick.

WIRELESS STATION.—The order for the wireless station which is to be erected in the Vatican City for the use of the Pope and the Vatican State, has been placed with Marconi's Wireless Telegraph Company, Limited. Communication will be carried out both by telegraphy and by telephony on the short-wave broadcast principle, and the range of the station will be world-wide.

Transatlantic Telephony.—INTERESTING EXPERIMENT.—An interesting experiment took place on June 25th, in London, when for the first time representatives of American news agencies carried on a series of conversations with their colleagues in America who were flying in an aeroplane at Whippany, New Jersey. The conversations took place in a small room of the American Telephone and Telegraph Co. at Bush House, London, and the Press representatives in the aeroplane merely had ordinary wireless earphones fitted to their heads. From the aeroplane speech was conveyed to the ground by a special system of transmission and relayed from the aerodrome, *via* New York, thence by wireless across the Atlantic to the Cupar receiving station in Scotland, and then by land line to Bush House in London. Transmission in the opposite direction was from Bush House to Rugby by telephone, thence by wireless to the receiving station at Houlton, Maine, and by land telephone to Whippany.—*Reuter's.*

NEW AMERICAN STATION.—A telephone conversation between London, England, and Cleveland, Ohio, handled successfully by the Lawrenceville, N.J., short-wave transmitter of the American Telephone and Telegraph Co. on June 1st marked the commercial opening of the Bell system's new short-wave transmitting centre. In future all transatlantic short-wave radio messages passing over Bell system wires in America will be transmitted by the new radio plant. By the end of the year it is expected that the transmitters of two additional short-wave channels to Europe and one to Buenos Aires, Argentina, will be operating from this point. The present short-wave transmitter at Deal, N.J., will then be taken out of commercial operation, to be used thereafter for experimental purposes. Equipment is being installed and tested in England and in South America for the proposed new channels. At the same time preparations are being pushed forward at Lawrenceville and at Netcong, N.J., the short-wave receiving centre in America which began operating last summer. Providing a third transatlantic speech channel, the new short-wave unit supplements the long-wave and short-wave systems previously operating between the United States and Europe. With a continually expanding volume of overseas conversations, reaching its highpoint in May, the two systems were becoming congested, says the *T. & T. Age;* the third channel will relieve the situation. The transmitting antenna for Europe are strung on a line of nineteen 180-ft. steel towers, placed 250 ft. apart and at right angles to the direction in which the voice waves travel. Each of the three transatlantic channels has three horizontal aerials, paralleling each other perpendicularly, connected by cross wires; they resemble a wire net of irregular mesh.

Behind the transmitting antenna is a second similar arrangement, designed to reflect the voice waves from the transmitting antenna and to reinforce them. As the equipment is directional, the energy is thus focused towards the point it is to reach; each antenna can transmit on three different wavelengths, so that when all the channels are completed they will be able to operate simultaneously without interfering with each other.

Radio Notes.

Austria.—LICENCES.—At the beginning of June, 1929, the number of Ravag subscribers was 352,578.

Denmark.—SHORT-WAVE STATIONS.—The short-wave station at Lyngby on June 23rd changed from 49.5 to 19.6 m., but this will probably not be permanent. Station 7RL transmits on 84.24 m. every Tuesday and Friday evening, after the closing down of the Danish broadcasting station. Every Friday this station broadcasts television and picture transmission.

RECEIVING SETS FOR HIRE.—A large firm in Copenhagen has begun to hire out receiving sets. The company makes a special type of apparatus, which it does not sell, but only hires for a small sum. The company that supplies electricity to Copenhagen, which has important interests in common with the radio industry, hires out these sets. A very great number of people are already hiring the sets. Meetings of protest have already been held, at which the Danish radio trade discussed whether this was dishonourable competition, says *World-Radio*, and as a protest against the action of the company, traders have resolved not to use any electricity on three days a week, in order to make their dissatisfaction known to the public.

Jugo-Slavia.—ZAGREB.—It is reported that the Zagreb station has presented an ultimatum to the postal authorities to the effect that unless the existing agreement can be amended in favour of the station it will have to cease operation. It has struggled under difficulties, says *World-Radio*, and cannot prolong its efforts unless it receives more help from the authorities.

Spain.—ALLIANCE.—A fusion of the hitherto competing Radio Barcelona and Radio Catalana stations has taken place. The latter is to retain its individuality and will keep its transmitter, but both stations will co-operate in future to the general benefit of listeners, says *World-Radio*. Radio-Barcelona announces that it intends erecting short-wave stations which will broadcast simultaneously with the medium-wave transmitter on the Tibidabo.

Wavelength Changes.—As already announced, the application of the new Prague plan will involve the rearrangement of B.B.C. frequencies. As a result of further tests, particularly in connection with the reception of the alternative programmes provided by Daventry (5GB), the B.B.C. has found it desirable to defer some of the changes announced to take effect on June 30th. It should be noted that later in the year night effect may cause such mutual interference between Langenberg and 5GB that it may become necessary to re-allot the frequencies of 5GB, Manchester, and Glasgow. The British changes, as revised, are set out below; they came into operation on June 30th.

Transmitter.	Old Wave. (Brussels Plan). Metres.	New Wave. (Prague Plan). Metres.
Daventry (5XX)	1,562.5	1,553
Manchester	378.5	377
Daventry (5GB)	482.3	479
Glasgow	401.1	399
London (1)	358	356
London (2)	—	—
Cardiff	323.2	310
Aberdeen	311.2	301
Bradford	294.1	288.5
Bournemouth	288.5	288.5
Dundee		
Edinburgh		
Hull		
Liverpool		
Plymouth		
Sheffield		
Stoke		
Swansea		
Newcastle	243.9	261
Belfast	302.7	242
Leeds	258.6	200

Whilst 200 metres is not a British exclusive wave under the Prague plan, special arrangements have been made for its use by the Leeds transmitter.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—July 24th. Victorian Railway Commissioners. Electric overhead travelling cranes, spare motors, and trolley wires. (A.X. 8092.)*

August 27th. Posts and Telegraphs Department. Cord-type switchboards. (B.X. 5428.)*

SYDNEY.—August 12th. Department of Public Works. Auxiliary hydro-electric generating plant for Burrinjuck. (B.X. 5365.)*

Bangor (N. Ireland).—July 23rd. Borough Council. Ironclad and cubicle switchgear, 3-phase, 50-cycles, 6,600 and 400/230 V. Three-phase transformers, 200 and 100 kVA. Underground cables for 6,600 and 400/230-V. Meters. (See this issue.)

Carlisle.—July 12th. Electricity Department. Supply, delivery, and erection of switchgear for use in an 11,000-V, 3-phase, 50-cycle sub-station. (June 28th.)

Chile.—VALPARAISO.—July 12th. Ministry of Marine. Two aerial towers for the new wireless station at Arica. (A.X. 8134.)*

SANTIAGO.—August 16th. Departments de Materisles y Almacenes, Chilean State Railways. Materials, including underground cable, train lighting material, lamps, &c. (C. 3069.)* Telegraph and telephone material, including copper wire and cable, dynamometers, table telephones, telephone cords, &c. (C. 3072.)

Dundee.—July 10th. Electricity Department. One seven-panel e.h.p. compound-filled sub-station switchboard for a 6,600-V, 3-phase, 50-cycle system. (June 28th.)

Edinburgh.—July 8th. Electricity Supply Department. One automatic electric elevator for Portobello power station. Specifications, &c., from Mr. E. Seddon, engineer and manager (£1 1s. deposit).

Egypt.—CAIRO.—July 15th. Ministry of Interior. One 250-kVA Diesel engine-driven a.c. generating set, with switch and control gear. (B.X. 5331.)*

August 15th. Diesel-engine alternator for the Zagazig Power Station. (B.X. 5393.)*

July 13th. Egyptian State Railways. Supply of underground unarmoured, lead-covered, paper-core telephone cable, approximately £E25,000 to £E26,000.

Epping.—July 25th. Epping Union. Installation of electric power for the laundry and well at the Institution. (See this issue.)

India.—SIMLA.—July 8th. Indian Stores Department. 30-kW oil engine-driven generating set for the Military Engineering Services, St. Thomas Mount, Madras. (B.X. 5364.)*

July 12th. Three continuous-wave wireless transmitting sets, 580 to 3,000 metres. (June 28th.)

London.—CENTRAL ELECTRICITY BOARD.—July 22nd. Supply, delivery and erection of central indicators and telephones for the Central Scotland Electricity Scheme, 1927. (June 7th.)

July 27th. Supply, delivery, and erection of 132,000-V overhead transmission lines for the Mid-East England Electricity Scheme, 1929. (June 28th.)

METROPOLITAN ASYLUMS BOARD.—July 10th. Supply and fixing of a complete wireless installation at Princess Mary's Hospital, Cliftonville, Margate. (June 28th.)

Newcastle-under-Lyme.—August 24th. Installation of electric lighting in a new wing to be erected at the high school and Orme Girls' School. (See this issue.)

New Zealand.—GREYMOUTH.—August 27th. Grey Electric Power Board. Generating plant for the Arnold River Hydro-Electric Scheme. (B.X. 5422.)*

WELLINGTON.—Post and Telegraph Department. September 7th. V.i.r. wire. (B.X. 5416.)*

Public Works Department. October 15th. Seven 5,500-kVA single-phase auto-transformers and accessories for the Waitaki power scheme. (B.X. 5417.)*

Penistone.—July 11th. West Riding Education Committee. Electric lighting installation at the Grammar School. Specifications, &c., from Education Officer, County Hall, Wakefield.

Portuguese East Africa.—LOURENCO MARQUES.—September 11th. Board of Port and Railways. Electric battery tractors and trailers. (A.X. 8172.)*

South Africa.—PRETORIA.—Posts and Telegraphs Department. August 1st. Telephone cable. (B.X. 5345.)*

August 8th. Telegraph materials, including iron tubular sidearms, porcelain insulators, paper sleeves, solder and insulating spindles. (A.X. 8112.)*

JOHANNESBURG.—August 1st. South African Railways and Harbours. 10-ton electrically-driven overhead travelling crane for Maritzburg workshops. (A.X. 8105.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Barnstaple.—Town Council. Accepted :—
Diesel set (£5,532).—Mirrlees, Bickerton & Day, Ltd.

Bradford.—Electricity Committee. Recommended :—
Circulating water pipes for two cooling towers.—Stanton Ironworks Co., Ltd.
Apparatus and steam piping for turbines.—Stewarts and Lloyds, Ltd.
Two interior cooling stacks at Valley Road power station.—Davenport Engineering Co., Ltd.

Canterbury.—Board of Guardians. Accepted :—
Installing electric light in the remaining portion of the institution (£145).—G. E. Dashwood.

Epsom.—Urban Council. Accepted :—
L.p. d.c. switchboard (£945).—English Electric Co., Ltd.

Glasgow.—Housing Committee. Recommended :—
Electrical installation for 492 houses at Haghill Estate (£2,076).—R. J. M'Intyre.
Watch Committee. Recommended :—
Electric lighting installation at Dixon Hall (£421).—Kennedy, Stark & Co.
Electricity Committee. Recommended :—
Frequency changer (£318).—J. P. Hall & Co.
Switchgear (£4,409).—A. Reyrolle & Co., Ltd.
Starting gear for motors (£520).—British Thomson-Houston Co., Ltd.
20,000-V cable (£4,419).—Callender's Cable & Construction Co., Ltd.
6,500-V cable (£2,320).—W. T. Glover & Co., Ltd.

Ilford.—Electricity Committee. Accepted :—
Electrical apparatus and switchgear for e.h.p. cubicle (£182).—Crompton Parkinson, Ltd.
Switchboard in connection with supply to works extensions of the Metropolitan Electric Cable Co., Ltd., at Chadwell Heath (£142).—Long & Crawford.

London.—SOUTHWARK.—Electricity Committee. Recommended :—
Alterations to cooling tower (£920).—Davenport Engineering Co., Ltd.
Repairs to economiser (£756).—Vickers Boiler Co., Ltd.

H.M. OFFICE OF WORKS.
Electric lamps.—Edison Swan Electric Co., Ltd.; Siemens Electric Lamps and Supplies, Ltd.

Maidstone.—Town Council. Accepted :—
Seven 6-wheeled trolley vehicles for the trolley 'bus service to Loose (£14,241).—English Electric Co., Ltd.

Rotherham.—Rural Council. Accepted :—
Installing electric lighting in 12 houses at Wickersley (£55) and in 40 houses at Thrybergh (£228).—F. L. Smith.

Salford.—Finance Committee. Recommended :—
Maintenance of internal telephones at town hall and education offices for five years, £190.—E. M. Evans & Son, Ltd.
Electricity Committee. Recommended :—
Four 216-kVA transformers, £440.—Yorkshire Electric Transformer Co., Ltd.

Sheffield.—Electric Supply Committee. Accepted :—
Transformers (£386).—Bruce Peebles & Co., Ltd.

Southport.—Education Committee. Accepted :—
Installing electric lighting at Holy Trinity schools (£169).—McGoff & Vickers, Ltd., Liverpool.

St. Helens (Isle of Wight).—Urban Council. Accepted :—
Installing electric lighting at the Puckpool Park Café (£110).—Isle of Wight Electric Light and Power Co., Ltd.

York.—Electricity Committee. Recommended :—
2,000-kVA transformer (£700).—Johnson & Phillips, Ltd.
Education Committee. Recommended :—
Electric light at Fulford Road Special Schools (amended tender) (£223).—H. Mandefield.

Forthcoming Events.

Tramways & Light Railways' Association.—July 3rd-6th. Sheffield. Annual Conference.

Overhead Lines Association.—Friday, July 5th. Summer meeting. Charabanc tour in the mid-Cheshire area.

Junior Institution of Engineers.—Saturday, July 6th. Visit to Southampton Docks and a tour of s.s. *Leviathan*.

Electrical Association for Women.—July 10th-12th. Newcastle-on-Tyne. Annual Conference.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names of suppliers of the following :—

NUTTALL'S potato peeling machine.

Notes.

A "Double-Deck" Compound Generator.

Two steam turbine generators which are to be added to the generating facilities of the Pacific Gas & Electric Co., San Francisco, each rated at 50,000 kilowatts, will be the first of the new "double-deck compound" type, and will be driven by natural gas brought from a source 240 miles away. The station will be very efficient, the result of employing 1,250-lb. boilers and using natural gas as fuel. Each main 1,200-lb. turbine set consists of a high-pressure element operating at 3,600 r.p.m. and a low-pressure element operating at 1,800 r.p.m., suitable for a maximum output of 62,000 kilowatts. A new type of construction will be used, in that the high-pressure turbine and generator will be mounted on top of the low-pressure generator, thereby saving the foundation and the floor space ordinarily required for the high-pressure turbine. In addition to the main turbines, two auxiliary turbines are to be used for driving the boiler feed pumps, which will absorb a considerable amount of energy, and therefore the turbines will be much larger than usual; they will be composed of condensing and non-condensing elements, the former being coupled to one end of the pump and taking steam from the existing 300-lb. boilers; the non-condensing element will be coupled to the other end of the pump and will take steam from the cross-over pipe between the main turbines. This arrangement permits of the two elements being operated at times independently and at other times together, so as to maintain at all loads the most economical heat balance on the installation as a whole.

Tramways versus Tubes.

In his presidential address at the fifty-sixth annual conference of the Institution of Municipal and County Engineers at Buxton recently, Lt.-Colonel E. B. Martin, city engineer and surveyor, Salford, strongly urged the speeding up of traffic reforms. A recent estimate for widening a main road between Manchester and Salford, he said, was well over £1,000,000 a mile, whereas the estimate for the construction of tubes was only about £600,000 a mile. Facts and figures such as those were compelling all interested to think whether in the larger cities the construction of underground tubes in place of the tramways would not be cheaper than widening the main thoroughfares.

Mihaly Television.

Herr von Mihaly, a Hungarian inventor who has been experimenting with television, has, it is stated, brought his system to such a state that pictures are now being broadcast from the German station at Witzleben daily to German post offices, where the public is invited to see the pictures.

Herr Mihaly recently came to London, says the *Financial Times*, for the purpose of obtaining the consent of the British postal authorities for transmission in this country. When the

arrangements are completed a company will be formed, and the apparatus, it is understood, will be sold to the public at 50s. each complete outfit.

Diesel Engine Users' Association.

At a recent meeting of the Association Mr. C. H. Faris read an informative paper on "Repairs to Diesel Engine Parts by Electro-deposition," which he illustrated with a series of interesting lantern slides. It was pointed out that any reduction in replacements of worn parts was desirable in these days of strict economy, and that this was a matter of concern to the engineer who had to keep his running costs low. In spite of the developments in the field of lubrication and modifications of designs and material to relieve heavily-loaded surfaces, or to resist corrosion, such surfaces still deteriorated. Reference was made to truing-up and refitting at a reduced diameter, and to welding in order to restore the worn part to size, but the author pointed out that any method of building up without heat treatment would be more satisfactory, provided that the resultant surface was capable of normal wear over a lengthened period. A method of electrochemical deposition had been evolved which had been successfully used for hydraulic rams, compressor plungers, steam engine piston rods, pump impellor shafts and numerous automobile parts, and while the cost of the operation had been less than that of replacement, additional satisfaction had been derived from the longer subsequent service obtained. It was pointed out, however, that the process under discussion was not an ordinary plating method, in which no real adhesion of the thin deposited layer occurred, but that very heavy deposits of nickel (and, in certain cases, of copper, chromium, cobalt, cadmium and lead) could be obtained with perfect adhesion. Adhesion, wear, and resistance to corrosion were the three principal points on which any such deposition process must be judged. Examples were cited of various tests of some of the results of the process, including tests by the National Physical Laboratory, both in the laboratory and under actual service conditions, exemplifying the adhesion of the deposited metal. With regard to wear, it was stated that the general idea that nickel was a soft metal was not borne out by data obtained from actual service conditions. Examples were quoted of reduction of wear and resistance to corrosion after the process had been applied to worn parts. Electro-deposition could be successfully carried out, and localised treatment could be applied if required. The author stated that recent extensions to the plant with which he was concerned had made it possible to handle individual jobs up to 6 tons and up to 17 ft. by 6 ft. diameter.

Electricity Supply at Newry, Co. Down.

On June 26th the new municipal electrical works of Newry were formally inaugurated by Viscount Craigavon, Prime Minister for Northern Ireland. The Prime Minister, who was accompanied by the Rt. Hon. J. M. Barbour, D.L., Minister of Commerce, after inspecting the works, set the machinery in motion and declared the works opened. At the subsequent luncheon, in responding to the toast of "The Prime Minister and the Government of Northern Ireland," he said countries which possessed large hydro-electric schemes were very fortunate from both the private and public standpoint. The Minister of Commerce mentioned that electricity consumption in Ulster was 47 kWh per head. In the North there was a rural population of 618,842, or about one-half of the entire population. The cost of tapping a transmission line for isolated power users would be heavy, and the demand made by ordinary farmers of an intermittent and seasonal character. The question of a comprehensive scheme had not been lost sight of, and within the past year a main transmission line had been erected between Belfast and Lisburn. The Government had provided for the future extension of this main line to the industrial centres of Lurgan and Portadown, and Bangor was proceeding with a scheme to take electricity from Belfast, which would also supply Holywood. At the moment the Electricity Commissioners had under consideration the feasibility of arranging an extension of this line to Newtownards, thus forming a ring main. The Government had not in any way discouraged the erection of supply plants in small towns and villages, but care was being taken that such schemes could be linked up with the comprehensive scheme referred to. The Government realised the need of developing electricity on lines which would lead to cheap power being available for industry. The electrical engineer for the Newry undertaking is Mr. P. A. Spalding, and the cost of the scheme was £17,500.

The Electrical Association for Women.

On June 12th a party of members of the Electrical Association for Women visited Ashford, Kent, at the invitation of the Ashford and District Branch of the E.A.W. The party was met at Maidstone by Mrs. Hayward and Mrs. Wilson, president and honorary secretary of the Ashford Branch, and was received by Mr. E. E. Hoadley at the Maidstone electricity works, where a short tour of the works was made. A halt was made for a picnic luncheon in the grounds of Leeds Castle, for which special permission had been obtained. On arriving at Ashford the party was welcomed by Mr. Southon, chairman, Ashford Urban District Council, in the Council Chamber. The members then proceeded to the electricity works, where the generation of electricity by means of oil engines was explained by Mr. H. L. Wilson, borough electrical engineer, and his assistants. An interesting experiment has been carried out in two cottages near the works, where all the heating is done by means of the waste heat from the station.

The Lord Mayor of Cardiff, Alderman W. R. Williams, J.P., and the Lady Mayoress, entertained over 250 members of the Association at a civic luncheon in the City Hall on June 19th. The guests represented the Cheltenham, Mid-Gloucestershire, Bristol, and South Wales and Monmouthshire branches of the Association. The Lord Mayor proposed "The Electrical Association for Women," and said he realised the importance of the Association in relation to industry.

Miss C. Haslett, director, E.A.W., in reply, said the Board of Education was soon to receive a deputation from the Association, which would put the point of view of the E.A.W. before the Board in regard to the teaching of electricity in schools. The Association was now looking forward to its biggest conference to be held outside London, at which the first woman Cabinet Minister (Miss Margaret Bondfield) would be present.

Miss Rhoda Parker proposed "The Cardiff Corporation Electricity Undertaking," which, she said, was one of the very few undertakings that were really giving a good and cheap service to the public. Mr. Morley New, the Cardiff electrical engineer, replied.

Immediately following the luncheon the party visited the electrical showrooms of the Cardiff Branch of the General Electric Co., Ltd. These showrooms are in course of reconstruction and extension, and the visitors were loud in their praise of the facilities afforded them under difficult circumstances to inspect the wide range of products exhibited.

Much interest was taken in the lantern lecture by Mr. W. Arnold on "Modern Domestic Lighting."

Following the tour of the showrooms, the visitors were the guests of the G.E.C. at tea at the City Hall, where the Lord Mayor occupied the chair.

The fourth annual conference of the Electrical Association for Women will be held at the North-East Coast Exhibition, Newcastle-on-Tyne, on July 10th to 12th. On the first day there will be a reception in the evening at the Oxford Galleries, Newcastle, by the president and committee of the North-East Coast Branch of the Association. On the second day there will be an opening ceremony at the Exhibition, at which the Rt. Hon. Margaret Bondfield, Minister of Labour, will speak. A luncheon at Barras Bridge Assembly Rooms, an official visit to the Exhibition, and a civic reception by the Lord Mayor and Corporation of Newcastle are also included in the second day's programme. The annual general meeting of the Association on the last day will be followed by a lecture on "Home Lighting" by Miss Lillian E. Eddy (U.S.A.), a luncheon at the Exhibition, works visits (including Reyrolle's), and a dinner.

The deputation arranged by the Electrical Association for Women to put the case of "electricity in schools" before the Board of Education was received at the Board on June 24th. Practically every section of the electrical industry and the teaching world was represented. The deputation was introduced by Mrs. Hammer, chairman of the E.A.W. Council, and the point of view of the E.A.W. was put by the director. Dr. S. Z. de Ferranti, president, E.D.A., spoke on behalf of the industry, Miss Clarke on behalf of the Association of Principals in Training College of Domestic Subjects, and Miss H. Shaw on behalf of the teachers.

Hydro-Electric Progress in Sweden.

Under the heading of "International and National Power Technics," Mr. J. Korner, a prominent Swedish consulting engineer, made an interesting contribution to a series of articles written in connection with the recent centennial celebration of the Royal University of Technology at Stockholm. After discussing electro-physical research, the wireless transmission of power, &c., the author refers to certain practical electrification projects in the world at large. He mentions that of the world's total water-power resources only about 10 per cent. is so far being utilised. The subject of long-distance transmission, super-power systems, and similar schemes, are reviewed, as well as the joint operation of water and steam electric power plant, which affords facilities to utilise both to the best advantage. From these premises the author takes up the subject of developments in Swedish electrification. The vital factor in electric power production nowadays is the finding of fresh consumers. Lighting, which was earlier the mainstay of power producers, is no longer to be relied upon, especially in view of the intensive work now going on for improving lamps. Electric heating is a subject that is now widely discussed; he, however, has reason to think that for general cooking purposes it is advisable to limit the use of electricity to such surplus current as may be available for load-equalisation purposes. The back-bone of the electric power industry is still the various industries which require power in some form or other. According to Swedish statistics of the Electricity Works' Federation, industrial establishments consume about 80 per cent. of the current generated (transmission losses deducted) in Sweden. Improved efficiency of the consumers' power plant and power economy together constitute a phase of the "rationalisation" of industrial operations. Much remains to be accomplished on this

score. In a country like Sweden, where the conditions for mass production are unfavourable in most branches, it is of the greatest importance to keep the technical equipment of the different works up to date. An interesting feature of the industrial electrification now going on in Sweden is the rapidly increasing consumption of electricity for electric furnaces for both steel and non-ferrous metal production. In comparison with the consumption of electricity by manufacturing establishments, the amount of power required for the electrification of the railways is of secondary importance to power producers. A complete conversion of the railways in Sweden would, according to a recent estimate, require only from 10 to 15 per cent. of the available water-power resources in South and Central Sweden. This question is therefore not of vital importance to the power companies, even though an increased consumption is not to be despised.

Fatality.

An inquest was held on June 24th at Morpeth on the body of Sidney James Wright (23) a shifter, who received a fatal electric shock in Choppington B Pit on June 21st. W. T. Oliver, coal cutter, stated that deceased and he erected a coal-cutting machine in the Plessey north district of the pit and in order to test it the current was switched on. Immediately Wright cried out, and was found lying clear of the machine. Thomas Jardine, electrician, said it was a practice to test all cables, but the cable in question was not tested. The jury returned a verdict that death was due to electric shock and suggested that the electrician should be censured for his negligence, but added that there was some excuse for his negligence when it was remembered that he had worked a shift of 17 hours.

A Rural-area Showroom.

In order to deal with inquiries from prospective and standing consumers in the Pudsey and Drighlington areas, into which it is now extending its mains, the City of Bradford Electricity Department has opened an auxiliary showroom at the premises of Messrs. S. Francis & Son, upholsterers, at Dudley Hill, exterior and interior views of which are shown in figs. 1 and 2. There are facilities for the inspection and demonstration of cookers, radiators, washing machines, lighting fittings, and so on. A letter is being sent to the rural inhabitants, informing them of the development, and requesting a visit to the showroom when they are next in the town.

Figs. 1 and 2.—Exterior and Interior Views of the Dudley Hill Showroom.

Late Legal.

Edison Accumulators, Ltd., *v.* Edison Storage Batteries, Ltd.

In the Chancery Division on Tuesday last, Mr. Justice Clauson heard a motion on behalf of Edison Accumulators, Ltd., against Edison Storage Batteries, Ltd., for an interlocutory injunction to restrain the defendant company from carrying on business under its present name or any name calculated to lead to confusion.

The Hon. Stafford Cripps, K.C., for the plaintiffs, said that the defendants were an English company which had been promoted by an American company of the same name. In 1913 an agreement was entered into between the American company and Edison Accumulators, Ltd., plaintiffs' predecessors in title when the American company had a number of patents in this country for protecting the manufacture of its accumulators. Those patents had since lapsed and the effect of the agreement was to give plaintiffs' predecessors sole selling rights of Edison accumulators except the sales to Governments. The agreement continued in force until March, 1925, when it was superseded by another agreement for a period of five years, with a provision for 90 days' notice to terminate in the event of any breach. Recently the original Edison Accumulators, Ltd., split itself into two companies—Britannia Batteries, Ltd., and Edison Accumulators, Ltd., the last named to have the benefit of the agreement of March, 1925. On March 19th last, after the present plaintiff company had been registered, notice was received from the solicitors to the American company, purporting to terminate the agreement on the ground that there had been breaches. On April 8th the defendant company was registered as a private company to carry on the business, *inter alia*, of selling accumulators in this country. What really had happened was that the American company cancelled the agreement on the allegation that there had been breaches which were denied and had formed the defendant company to carry on the same business in this country. There were two considerations: one was whether apart from the agreement the American company could register a private company and carry on business under a name which was identical with the plaintiffs' name, and whether in view of the agreement they were stopped from so doing. Counsel submitted that the name of the defendant company so closely resembled plaintiffs' that there was bound to be confusion.

Sir Duncan Kerly, K.C., for the defendants, submitted that there would be no confusion. The use of an honest description of goods could not be stopped.

His Lordship, granting an interlocutory injunction in the terms of the notice of motion, said that he was satisfied that it would be impossible for defendants to trade under their present name without causing some confusion.

On the application of Sir Duncan Kerly his Lordship suspended the injunction pending notice of appeal.

Electricity Supply on the Isle of Man.

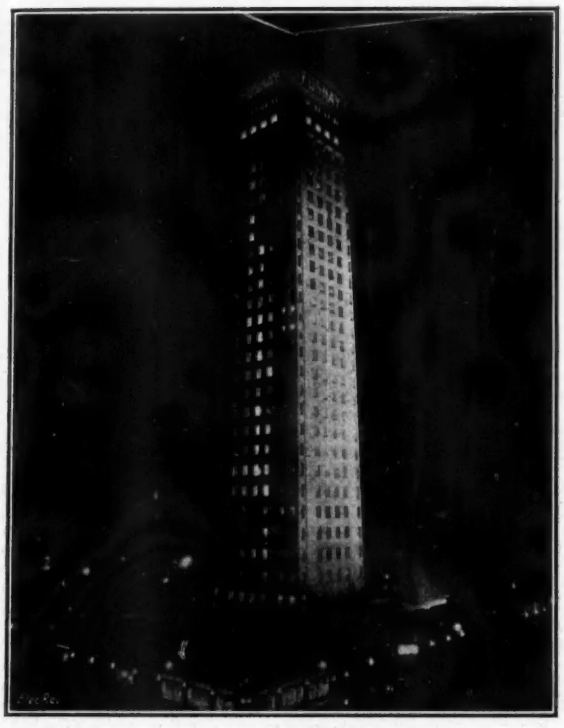
The Commission appointed by the Governor to inquire into and report on the most economical method of providing an electricity supply for the island has recently issued its report. According to the *Isle of Man Weekly Times*, the Commission has surveyed the whole of the area outside the Douglas electrical boundary, with a view to ascertaining the potential demands for electricity, as well as the cost of giving supplies. The report states that the Douglas Corporation Electricity Department appears to be satisfactory, and will be even more so when the new Pulrose station is in operation. The Commission does not consider that non-statutory supplies, such as that given by the Manx Electric Railway at 550 V from the trolley wire, should be perpetuated or extended, and it recommends that within three years of the passing of any Act authorising an island supply all domestic supplies should be given at a pressure not exceeding the standard of 230 V. The question of generating by water power has been considered, but the only suitable source appears to be at Sulby, and at this site there are no reliable records of the variation of the flow in the river, and the rainfall records are meagre. If such a scheme were technically feasible the annual charges in the first stages of development would be so high that it could not compare favourably with the probable cost of obtaining electricity from the Pulrose station. It is recommended, however, that records of the flow in the river should be taken over a period of years. The relative merits of granting a concession to a company or the setting up of an insular electricity board have been studied, and the Commission recommends that powers to distribute electricity throughout the island, excluding the Douglas Corporation's area, should be given to the Electric Development & Securities Trust, Ltd., a concern which is closely connected with the General Electric Co., Ltd., the electricity being purchased in bulk from the Douglas Corporation's new power station at Pulrose. The report does not state at what price electricity could be sold in the outer towns under such a scheme, but it is estimated that in the first complete year of working the average price obtained per kWh would be 4.2d., falling to 3.5d. per kWh in the fourth year of operation. Accompanying the report are a number of appendices, including a map showing the proposed transmission lines running from the point at which the bulk supply would be taken. These conductors would, for the sake of economy, be carried overhead.

Domestic Supply Tariffs.

In connection with the leaderette on domestic supply tariffs in our last issue (p. 1132), and the reference to the Newcastle-upon-Tyne Electric Supply Co.'s domestic tariff (p. 1167), our attention has been drawn to a similar system of charging which was introduced by the Bolton Corporation in February, 1925. At that date the charge for a minimum consumption per quarter was 4.75d. per kWh, and 0.75d. per kWh for additional energy. These charges were reduced in February last, however, to 4.5d., less 2½ per cent. discount, and 0.5d. per kWh, respectively, and where the consumption does not reach the minimum, to 4.5d. per kWh, but with no discount.

The Foshay Tower.

The building illustrated below, known as the Foshay Tower, has recently been constructed in Minneapolis, Minnesota, United States. It stands 447 ft. 3 in. above ground, measuring 81 ft. by 87 ft. at the base, and 59 by 65 ft. at the top, the four sides sloping 11 ft. to the top. Its height from the foundation base to the top is 509 ft. 3 in. The tower proper contains 2,599,666 cubic feet, with approximately 118,000 sq. ft. of rentable area.



The Foshay Tower.

Amongst the interesting features of the tower is its artificial illumination. Four signs, each 10 ft. high and 43 ft. long, are located on each side of the tower, between the 29th and 30th floors. The signs employ glass tubes, and can be seen for a distance of fifteen miles. The tower is floodlighted at night with coloured light of approximately 125,000 watts, 16 balcony units of 500 watts each, and 368 roof set-back units of 60 watts each. An official aerial beacon has been introduced, using a revolving light of two million candle power, which, mounted on such a tall building, the tallest in the Pacific Northwest, is considered the most conspicuous light in the entire territory for guiding night flyers. It revolves six times per minute and under good conditions of weather it is visible for a great many miles.

B.S.S. for Illumination Glassware.

The British Standard Specification No. 364-1929, for neck and flange dimensions of illumination glassware and carriers, which has just been issued by the British Engineering Standards Association, ensures that the glassware and carriers shall be interchangeable. Dimensions are given for the necks and galleries for electric light and gas fittings, and for the flanges and supporting rings for bowl fittings for electric light and gas. The diameter of the clearance hole in shades, reflectors or their appropriate galleries for the British standard bayonet lampholder is also included. These dimensions have been arrived at after due consideration of the external lug-circle diameters of gas mantles, the dimensions of electric lamps and of the British standard bayonet lampholder, and for convenience of reference extracts from the appropriate B.S. Specifications Nos. 161 and 52 and a table giving the external lug-circle diameters for gas mantles are given in appendices. Copies of the new specification, No. 164-1929, may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

E.P.E.A. Outing.

On June 29th a party of Midland members of the Electrical Power Engineers' Association made a tour of some of the most interesting sections of the distribution system owned by the Staffordshire, Shropshire and Worcestershire Power Company. The visit concluded with tea and an inspection of the Stourport generating station.

Educational.

The 1929-30 session of the Loughborough College commences on September 20th. Particulars of the various courses are clearly laid out in the calendar for the session.

Embankment Fire.

An inquiry into the cause of the fire which occurred on June 6th in the telephone subway under Victoria Embankment, London, was opened on June 17th, and continued on June 25th. Dr. F. J. Waldo, the city coroner, said that three other fires had occurred under the Victoria Embankment in the last nine months, and in each case the cause had been determined as due to the ignition of combustible material by sparking from electrical apparatus and cables. It was noteworthy that all the fires were discovered shortly after the switching on of the electric current for lighting the Embankment. It was pertinent to find out what had been done by the various interested authorities since the inquest on the subway fire of September 8th.

Mr. T. D. Simmons, district officer of the London Fire Brigade, said that at the time of the fire he found what appeared to be about 15 ft. of cable alight on the west side of the subway entrance. The lead of the cables had melted and the wires were scattered about.

Mr. C. A. Baker, divisional electrical engineer to the London County Council, said that the circuits supplying electricity for the refuge and kerb lamps on the Victoria Embankment were switched on at 9.35 p.m. on June 6th, and three minutes later a fuse blew out on one of the refuge circuits, which consequently became dead. The new electric system adopted by the L.C.C. employed cables under the footpath and not in the subway.

Mr. E. Gomershall, superintending engineer, G.P.O., said that the linking up of the lighting leads and the refuge lamps with some other wires which proved to be a temporary lighting lead about 50 yards long might have caused the trouble. The leads to the refuge lamps were unsatisfactory. They were insulated with vulcanised rubber, and had no metal covering, and the arrangements were not devised with a proper regard to the plant in the subway. If cables and gas mains were properly maintained in subways there should be no difficulty. He would like to see the gas mains out of the subway altogether, so that the Post Office could use their space.

The inquiry was concluded on July 2nd, when the jury returned a verdict, according to the *Daily Telegraph*, to the effect that the fire was accidental and was caused by sparking at a defective porcelain connector temporarily used by the London County Council to replace the cut-out or switchbox formerly placed at the junction of the main cable with the overhead lighting cables. The jury recommended that the Exchange Telegraph Co. be requested to replace the gutta-percha insulation of its cables by a more recognised and efficient method of insulation. It also added riders recommending that all h.p. cables carrying over 200 V and dormant cables be removed from the subways, and that all subways be permanently wired for lighting according to the I.E.E. Rules. In his summing up Dr. Waldo asked the jury to consider whether coal gas should or should not be allowable in a subway in association with electrical cables, and whether in its opinion it would not be advisable to recommend the use of special indicators for the purpose of detecting the presence of inflammable gases in all subways. He also asked whether the jury would advise a Government inquiry into the whole question, and whether it was advisable to suggest an amendment to the Subways Act whereby the laying of gas mains in the roadway might be rendered obligatory.

Appointments Vacant.

Plumber jointer for Colchester Corporation. Power station charge engineer at Kalyan for the Great Indian Peninsular Railway. Shift steam engineer for Bradford Corporation. Assistant mains engineer for Ealing Borough Council. Station engineers required by the Government of Nigeria. Temporary outside representative and canvasser, relief charge engineer, and mains assistant required by Fulham Borough Council Electricity Department. (See our advertisement pages to-day.)

Institution Notes.

Institution of Electrical Engineers.

NORTH-MIDLAND CENTRE.—The North-Midland Centre and the Sheffield Sub-Committee combined to hold a summer meeting on June 29th and 30th. It took the form of an excursion by road to Buxton and district, with a dinner and dance on the Saturday evening.

METER AND INSTRUMENT SECTION.—As nominations were not made by the general body of members of the Section to fill the vacancies which will occur on the Section Committee on September 30th, 1929, those members nominated by the Committee are, under the Section's rules, duly elected; the Committee for 1929-30 will therefore be as follows:—Chairman: Mr. E. W. Hill. Ordinary members of Committee: Messrs. W. E. C. Alliss, E. Fawssett, C. H. W. Gerhardi, A. J. Gibbons, J. T. Haynes, F. C. Knowles, C. W. Marshall, A. Middleton, E. H. Miller, William Phillips, G. F. Shotter, R. S. J. Spilsbury, a member of Council (to be elected by the Selection Committee), the president, I.E.E. (ex-officio), the chairman of the I.E.E. Papers Committee (ex-officio).

NEW SUB-CENTRE.—A Hampshire and Isle of Wight Sub-Centre of the Institution was formally inaugurated at a meeting of the Hampshire members held at the Portsmouth Guildhall on June 27th. The president, Lt.-Col. K. Edgcumbe, and secretary, Mr. P. F. Rowell, attended, and a civic welcome was extended by the deputy Lord Mayor (Councillor Frank P. Privett, J.P.), in the absence of the Lord Mayor (Councillor J. E. Smith, J.P.), who is recovering from an operation. The deputy Lord Mayor remarked that the formation of the Sub-Centre in Hampshire was a sign of progress, and claimed that he was a pioneer of electric motors in his own particular trade, for 27 years ago he first bought a second-hand power saw bench and ordered a 2-h.p. electric motor, which was still in his workshop to-day. Councillor Privett added that Portsmouth was proud of its Corporation electricity undertaking and of its engineer and manager, Mr. B. Handley, who had done great things for the city. Portsmouth, in fact, almost looked upon the electricity undertaking as one of its main industries. He hoped the new sub-centre would meet with the success it deserved.

Thanks were expressed for the welcome given, on the motion of Col. Edgcumbe, seconded by Mr. Handley, and by a unanimous vote Mr. B. Handley was elected first chairman of the new Sub-Centre, and other officers were elected as follows: *Vice-chairman:* Mr. W. G. Turner, Southampton; *hon. secretary:* Mr. S. Harcombe, Portsmouth; *hon. treasurer and hon. asst. secretary:* Mr. P. G. Spary, Southampton; *committee:* (electricity supply) Mr. R. Ayton (Winchester) and Mr. E. L. Ingram (Bournemouth); (manufacturers) Mr. N. W. Prangnell (Portsmouth) and Mr. H. J. Grapes (Southampton); (Post Office) Mr. J. F. McMullen (Southampton); (education) Prof. G. D. A. Parr (Portsmouth) and Prof. H. Stansfield (Southampton); (Navy and Admiralty) Mr. H. Martin (Portsmouth) and Mr. G. Shearing (Portsmouth); (Army and Air Force) Major C. F. D. Suggate (Portsmouth), General Sir V. L. Raven (Hook), and Lt.-Col. A. E. le Rossignol (Bishop's Waltham). It was mentioned that the membership for the county was 251, and that over 200 resided in the Portsmouth and Southampton districts.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Resignation Honours.—The Rt. Hon. Sir HAMAR GREENWOOD, Bt., K.C., who has been created a baron for political and public services, is a director of several electrical manufacturing companies and is a former Secretary of the Department of Overseas Trade. Mr. DOUGLAS H. HACKING, O.B.E., M.P., was Parliamentary Secretary to the Department of Overseas Trade from 1927 to May, 1929. Sir PHILIP CUNLIFFE LISTER, K.B.E., M.P., who is made a G.B.E., was until recently President of the Board of Trade; and Sir W. JOYNSON HICKS, Bt., who is created a viscount, is also a former head of the Department of Overseas Trade.

The Westinghouse Electric and Manufacturing Co. has appointed an Englishman, Mr. H. SPEIGHT, to the position of section engineer in charge of electro-chemical and electro-metallurgical work in the General Engineering Department of its works at East Pittsburgh, Pennsylvania. Mr. Speight studied engineering at Liverpool University and commenced his career on the mechanical side with the British Westinghouse Co., now the Metropolitan-Vickers Co. Later he entered the service of the Manchester Corporation Electricity Department, and then became manager of an electrical contracting company in Liverpool. After a few years in British Columbia he went to the Westinghouse Co.

Lieut. LANCELOT E. C. M. PEROWNE, R.E., who was recently appointed adjutant of the Tyne Electrical Engineers, has been given the rank of captain in the Territorial Army while so employed and seconded in the Royal Engineers.

The wedding recently took place at Briercliffe of Mr. HERBERT SHACKLETON, B.Sc., of Manchester Electricity Department, and Miss Gladys Sutcliffe, of Briercliffe.

The staff and employés of Paisley Corporation Electricity Department presented Mr. JOHN M. BARBOUR, chief clerk, with a silver salver on the occasion of his marriage. Mr. W. Blair Smith, the manager, made the presentation, and spoke of the fine relationship that existed between Mr. Barbour and the whole of the employés. Mr. Barbour returned thanks on behalf of himself and his future wife.

Mr. W. S. JOHNSTON, manager of the Dumfries Electricity Works since 1913, has been appointed borough electrical engineer and manager under the Corporation of St. Helens, Lancashire. The salary starts at £800, rising in four years to £1,000, approximately double Mr. Johnston's present salary.

At the Convention of the American I.E.E. at Swampscott, Mass., on June 27th, Mr. ALLAN B. FIELD (Manchester) received the Lamme medal for experimental mathematical work and the Scott medal for outstanding achievements in the electrical field during the past year.

The marriage took place at Edinburgh on June 24th of Mr. GEORGE BRUCE, an electrician on the staff of the Urban Electric Supply Co. at Berwick-on-Tweed, and Miss Dora Robertson, of Morebattle.

The Millom Urban Council has increased the salary of the electrical engineer from £250 to £300 per annum, as from June 1st last.

Bolton Town Council has increased the salary of Mr. H. MAKIN, buyer and salesman, in the Electrical Fittings Department, from £350 to £375.

Mr. J. G. GUNTER, the newly-appointed assistant secretary and solicitor to the Electricity Commissioners in London, whose commencing salary is £1,750 per year, has been deputy town clerk at Bradford for nine years past, at a salary of £1,150. He was articled to the Bradford Town Clerk in 1904. He has met members of the Electricity Commission on a good many occasions on behalf of Bradford Corporation in special inquiries.

The West Ham Town Council, in accepting the resignation of Mr. F. W. PURSE, borough electrical engineer, on his appointment as chief engineer to the London and Home Counties Joint Electricity Authority, has decided to present him with an illuminated testimonial on vellum, expressing the Council's high appreciation of his very valuable services as engineer and manager of the electricity undertaking since June, 1919.

Mr. ROBERT TURNER, electrician, Kelty, Fifeshire, who has been in charge of the Newcastleton Electric Supply Co.'s plant for the past three years, has received an appointment with the Anglo-Persian Oil Co. Mr. Turner received his training with the Fife Coal Co. at its Aitken Power Station and the Central Workshops, Cowdenbeath.

Mr. WILLIAM COUSINS, who has been head of the electrical engineering department of Fife Mining School, Cowdenbeath, has been appointed to a similar position in the new Technical School, Kirkcaldy.

The directors of the Midland Bank, Ltd., announce with much regret the retirement of Mr. E. W. WOOLLEY from the position of joint managing director after having completed upwards of 46 years' service with the bank. Mr. Woolley retains his seat on the board.

On Saturday last Mr. G. A. PECK, sectional engineer for the Post Office, who is retiring on pension after 44 years' service, was honoured by his staff, colleagues and friends at the Wellington Hotel, Middlesbrough. Gifts presented included a mahogany music cabinet, a cone loud speaker, and a box containing a set of chess pieces. Mr. Peck's son was presented with a box containing a fountain pen and a propelling pencil.

Mr. J. DICKSON, of Llandudno, a well-known Post Office engineer in North Wales, and for 14 years executive engineer to the Bangor section, retired on Saturday last after 46 years' service in Post Office engineering departments. He was engineer in charge of the installation of the automatic exchanges in Llandudno, Colwyn Bay, and their environs. At a meeting of officials and engineers from all local centres last Saturday Mr. Weaver, the superintendent engineer for North Wales, presented Mr. Dickson with a piece of furniture on behalf of the staff.

Obituary.—MR. C. W. HILL.—In our reference last week to the late Mr. Claude W. Hill, we mentioned that he was an A.M.I.E.E. This was incorrect, as he was a Member of that Institution, as well as of the Institution of Mining Engineers.

MR. R. F. CLARKE.—The death occurred on June 25th, at the age of 52 years, of Mr. Richard Frederick Clarke, who was in business as an electrician in Park Lane, Folkestone.

Will.—The late Mr. R. H. BENSON left £116,481 gross and £97,522 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

General Charging Stations, Ltd.—Private company. Registered June 24th. Capital, £1,000 in £1 shares. Objects: To carry on the business of accumulator and battery chargers, electrical engineers, wireless dealers, &c., and to establish accumulator and battery charging stations in all parts of the U.K. The subscribers (each with one share) are:—Winifred Anderson, 102, Central Park Road, East Ham, E.6, stenographer; Ethel Green, 16, Nunhead Lane, Peckham, S.E.15, clerk. The first directors are to be appointed by the subscribers. Secretary (*pro tem.*): W. Symons. Registered office: 150, Southampton Row, W.C.1.

Rapid Electric Arc Welding & Metals Co., Ltd.—Private company. Registered June 25th. Capital, £500 in £1 shares. Objects: To carry on the business of welding metals by means of electricity, the welding of steam and other boilers, furnaces, combustion chambers, and boiler shells, and of any metal parts, &c. The directors are:—J. A. Dickinson, 19, Marine Park Mansions, Wellington Road, New Brighton; Elsie Gough, 18, Marine Park Mansions, Wellington Road, New Brighton. Qualification: One ordinary share. Registered office: 60, Castle Street, Liverpool.

Wood Auto-Electrical Co., Ltd.—Private company. Registered June 26th. Capital, £4,000 in £1 shares. Objects: To acquire the business of an automobile, electrical and radio engineer carried on by R. Wood at 6 & 8, Half Moon Street, Huddersfield, as "Wood the Battery Man." The first directors are:—R. Wood, 29, Upper George Street, Huddersfield, electrical engineer (chairman and permanent managing director); L. Birch, 27, Union Street, Huddersfield, electrical engineer; J. H. de P. Thorold Gosset, 136, Chesterton Road, Cambridge. Qualification, £50.

Set Manufacturers, Ltd.—Private company. Registered June 25th. Capital, £100 in £1 shares. Objects: To carry on business as manufacturers of and dealers in electrical, telegraphic, telephonic and wireless instruments, gramophones, appliances, drawn wire, electric cabling and lamps, and all parts, articles, and things used in connection therewith, &c. The first directors are:—C. J. Laker, 4, Blunt Road, South Croydon, chartered surveyor (permanent director and chairman); Mrs. Betty Laker, 4, Blunt Road, South Croydon. Qualification, £10. Secretary: C. J. Laker. Registered office: 60, Strand, W.C.2.

Gould & Lake, Ltd.—Private company. Registered June 25th. Capital, £1,000 in 5s. shares. Objects: To acquire the business of dealers in wireless and electrical apparatus now carried on by C. H. Gould and H. G. Lake at Tram Terminus, Poole, Dorset, as "Radio House." The directors are:—C. H. Gould (permanent managing director), "La Estancia," Tatnam Road, Poole, Dorset; H. G. Lake, Serpentine Road, Poole, Dorset. Qualification, £5 shares. Solicitor: W. H. Budge, 217, High Street, Poole, Dorset.

Camden Electric, Ltd.—Private company. Registered June 28th. Capital, £500 in £1 shares. Objects:—To carry on the business of electricians, mechanical and general engineers, manufacturers of and dealers in electrical apparatus, plant and appliances, &c. The first directors are:—J. H. Heal, Vale Villa, Hampstead Heath, N.W., builder; W. Heal, 176, Adelaide Road, Hampstead, N.W., builder; T. H. Smerdon, 4, Lanchester Road, N.6, electrician; L. R. Morrell, 17, Huddleston Road, N.7, electrician. Secretary: L. R. Morrell. Registered office: 92, Park Street, Camden Town, N.W.1.

John E. Matkin, Ltd.—Private company. Registered June 28th. Capital, £1,000 in £1 shares. Objects:—To adopt an agreement with J. E. Matkin, and to carry on the business of electrical contractors, engineers and wireless dealers formerly carried on by him at Stockwell Road, Hinckley, Leicester. The directors are:—J. E. Matkin, engineer, and Gertrude M. Matkin, 14, Cleveland Road, Hinckley (both permanent). Secretary: J. C. Carr Braint. Registered office: Co-operative Chambers, Carts Lane, Leicester.

Official Returns of Electrical Companies.

Perak River Hydro-Electric Power Co., Ltd.—Capital, £1,000,000 in 500,000 8 per cent. preference and 500,000 ordinary shares of £1 each. Return dated December 28th, 1928. 500,000 preference and 356,237 ordinary shares taken up. £501,507 paid on 500,000 preference and 1,507 ordinary shares. £354,730 considered as paid on 354,730 ordinary shares. Mortgages and charges, £2,600,000. Return of allotments, made up to March 26th, 1929, shows a further 75,000 ordinary shares allotted, payable in cash and fully called up.

Thomas J. Digby Illuminating Engineering Co., Ltd.—Capital, £20,000 in 10,000 preference and 10,000 ordinary shares of £1 each. Return dated December 13th, 1928. All shares taken up. £2 paid. £19,998 considered as paid. Mortgages and charges, nil.

Llansilin Electricity Co., Ltd.—Capital, £1,500 in £1 shares. Return dated February 6th, 1929. 1,260 shares taken up. £1,260 paid. Mortgages and charges, nil.

Cornwall Power Co., Ltd.—Capital, £400,000 in 150,000 7 per cent. convertible preference and 250,000 ordinary shares of £1 each. Return dated May 9th, 1929. 150,000 preference and 212,500 ordinary shares taken up. £152,507 paid on 150,000 preference and 2,507 ordinary shares. £209,993 considered as paid on 209,993 ordinary shares. Mortgages and charges, nil.

Cablon, Ltd.—Capital, £2,000 in £1 shares. Return dated January 2nd, 1929. All shares taken up. £201 6s. paid (being £1 per share on 2 and 2s. per share on 1,998 shares). Mortgages and charges, nil.

Cable, Telephone & General Trust, Ltd.—Capital, £550,000 in 300,000 6 per cent. cumulative preference, 150,000 "A" 7 per cent. non-cumulative preference and 100,000 ordinary shares of £1 each. Return dated May 22nd, 1929. 218,520 6 per cent. preference, 150,000 "A" preference and 80,000 ordinary shares taken up. £448,520 paid, plus £20,000 premiums paid on the ordinary shares. Mortgages and charges, nil.

C. Mortlock, Ltd.—Capital, £1,000 in £1 shares. Return dated January 26th, 1929. 851 shares taken up. £800 paid. £51 considered as paid. Mortgages and charges, £350.

Electric Transmission, Ltd.—Capital, £10,000 in £1 shares. Return dated March 13th, 1929. 5,000 shares taken up. £5,000 paid. Mortgages and charges, nil.

Lincolnshire Electrical Co., Ltd.—Capital, £500 in £1 shares. Return dated November 15th, 1928 (filed April 4th, 1929). All shares taken up. £500 paid. Mortgages and charges, £500.

Hightensite and Ebonite Manufacturing Co., Ltd.—H. G. Judd, of 8, Fredericks Place, Old Jewry, E.C., was appointed receiver on June 20th, 1929, under powers contained in first and second debentures.

J.G., Ltd.—Debenture dated June 10th, 1929, to secure £650, charged on the company's undertaking and property, including uncalled capital. Holder: J. P. Gandy, 21, Leadenhall Street, E.C.3.

Shipham & Co., Ltd.—Charge on properties, &c., in Hull, dated June 17th, 1929, to secure £15,000. Holders: Eagle, Star and British Dominions Insurance Co., Ltd.

Satisfaction in full in June, 1929, of mortgage dated June 10th, 1901, and debentures dated June 17th, 1924, securing £2,500 and £7,000, respectively.

Saunders Electrical Co., Ltd.—Satisfaction in full on March 14th, 1925, of mortgage dated September 9th, 1920, securing £1,000.

Astra Dynamo Co., Ltd.—H. C. Faulkner, of 27, Disraeli Road, Putney, S.W., was appointed receiver and manager on June 6th, 1929, under powers contained in debenture dated November 30th, 1925.

Marpole & Frisby, Ltd.—F. S. Wilks, 31, Lombard Street, E.C.3, ceased to act as receiver and manager on June 20th, 1929.

City Notes.

Globe Telegraph and Trust Co., Ltd.

The annual meeting of this company was held on June 25th, the Earl of Midleton (chairman), presiding. In presenting the report and accounts (ELEC. REV., June 21st, p. 1114), the chairman said the changes in capital investments had been small in the period under review. There was one larger investment, the American Telegraph & Cable Co., and negotiations were still proceeding with the Western Union Telegraph Co., but up to the present the directors had not received what they considered to be a satisfactory offer. The trust, however, must be prepared to face a loss either in the near future or when the present lease expired. The American Telephone and Telegraph Corporation had made an issue of 4½ per cent. gold bonds of $100 at par, carrying rights of conversion into ordinary shares, and the trust had taken up its allotment of 116 shares. The Mackay companies had now become the Postal Telegraph & Cable Corporation, and the International Telephone and Telegraph Corporation, but the more important merger affecting the company's interests was that between the Eastern Associated Telegraph Companies and Marconi's Wireless Telegraph Co. In 1915 the trust's shares were for a time quoted below par and its securities were valued at £3,842,537, but in 1929 at the date of the issue of the balance sheet, the value was £9,013,700, and the price of the shares had struck a level of 28. The cable and wireless merger was largely accountable for this great development. The trust held in all £2,915,000 in shares of the three great cable companies, and the directors had had no hesitation in signifying their assent to the exchange of shares for what was offered them in an undertaking which was the only means of safeguarding the position of Great Britain in the communications of the world, and assuring for the industry its fitting share of business, which would be so greatly developed by modern science. The support of the shareholders of the respective companies had been such that there was no further obstacle to the completion of the merger, and an official announcement bringing the plan into operation would be made in a few days. The report and accounts were adopted and a special resolution was passed providing for the widening of the company's present restricted powers of investment.

Anglo-Argentine Tramways Co., Ltd.

The accounts of this company were abstracted in our issue of June 21st, p. 1113, and the annual meeting was held on June 25th. Sir G. Touche (chairman), who presided, said that during the year under review the traffic surpassed all records, the number of passengers carried being 570,079,027, an increase of 9,331,473 as compared with the previous year. Referring to the conditions under which the company catered for the inhabitants of Buenos Aires, he said that in addition to motor omnibuses, other competition in the form of taxicabs made its appearance in September last, which not only prejudiced receipts, but help to nullify the company's efforts to improve the services. Progress through the principal thoroughfares had been rendered so slow as to be a matter of general concern. The company had continued to pursue its policy of bettering services, on both surface and underground lines, but it was clear that a scheme of co-ordination of the tramway, subway and omnibus services was necessary. Some 6,000,000 more passengers were carried by the subway than in 1927, and the time was approaching rapidly when this line would be taxed to the limit of its present capacity. The final plans for the second subway, which would run between the railway termini at Retiro and Constitucion, were presented during the year for the approval of the authorities, and they were now awaiting the ratification of the *ad referendum* agreement with the Intendente of Buenos Aires, which provided for equitable adjustments in the pre-war tariffs. The report and accounts were adopted.

Aron Electricity Meter, Ltd.

The report for the year ended March 31st last shows a profit of £6,594, to which is added £161 brought forward, making £6,755. The report states that in March last the 6 per cent. cumulative preference shares were converted into 6 per cent. cumulative income debenture stock and the directors recommend the payment of 6 per cent. dividend and interest on these shares. In view of the competition at present existing in the meter business and the uncertainty of the trend of events in the immediate future, the directors recommend that no dividend be paid on the ordinary shares (last year 4 per cent.), and that £1,795 be carried forward. Meeting: July 8th.

Stock Exchange Notices.

Dealings in the following have been allowed by the Committee under Rule 159:—

International Telephone and Telegraph Corporation.—5,025,540 shares of capital stock of no par value.

Shanghai Electric Construction Company.—53,148 shares of £1 each, fully paid, Nos. 500,001 to 553,148.

Underground Electric Railways Company of London.—11,777 ordinary shares of £1 each, fully paid, Nos. 7,167,558 to 7,179,334.

Ruston & Hornsby, Ltd.

Presiding at the annual meeting on June 24th, Col. J. S. Ruston (chairman) said that the investments in other companies remained the same as in the preceding year, and represented chiefly an interest in the associated company of Ransomes, Sims & Jefferies, Ltd. The report showed an improvement on the previous year, although the agricultural depression in the home market and the very slow recovery in export markets continued to affect adversely the company's trading. The volume of business during the year was the largest since the war. The principal increase was in sales of cold starting crude oil engines and centrifugal pumps. The sales in the excavator branch of the business had also shown a considerable increase. Important additions were made during the year to the oil engine manufacturing facilities, and the company was pursuing a progressive policy in connection with the development of excavators and oil engines, the latter entailing a programme of engineering research and involving in the aggregate a considerable annual expenditure. The report and accounts were adopted.

Berry's Insulating and Building Products, Ltd.

The statutory meeting of this company was held on June 27th. Mr. A. F. Berry, who presided, said that some of their best customers had recently received orders of unprecedented magnitude for electrical machinery to be used in connection with the Government's electrification scheme, and that the company in turn had now received orders to its full capacity for its highest grade insulations for use in important sections of this machinery. Additional plant had had to be ordered to execute this class of work, with which it would appear the company would be profitably employed for the next two years or more. The orders in hand were so substantial and extended over such a period that for the next two or three years selling costs would probably be negligible, and those of manufacture reduced to a low point. This position gave full power to concentrate on equipment and production, and with the extra working capital provided by the issue for the businesses should permit of substantial profits.

Telephone Manufacturing Co., Ltd.

The net profit for 1928 was £20,220, to which is added £24,566 brought forward, making £44,786. The directors recommend that £10,000 be utilised in writing down new issue expenses, leaving £34,787 to be carried forward. The report states that inadequate prices on the manufacturing side have continued during the year, and the directors do not feel justified in continuing to compete for business at such unremunerative prices at the expense of the more profitable side of the business. Accordingly, they have under consideration a scheme by which the installation side of the business will be formed into a separate company, which, on the profits earned, will at once become a dividend-paying investment. Particulars of this scheme will be circulated to shareholders at the earliest possible date.

Hall Telephone Accessories (1928), Ltd.

The interim report states that on the first half-year's working for 1929 an interim dividend of 4 per cent. (less tax) has been declared. Business has continued to be satisfactory in all branches, and a general expansion has occurred. Benefits of this increased trade will accrue mainly in the second half of the year. No further patents have been sold, but trade under licences granted in foreign countries has expanded. Indications are that the absorptive capacity of the various countries served by the company's proprietary articles is increasing, and the company had been requested to anticipate delivery dates on certain home contracts. The demand for stamp-selling machines required for public service in connection with the advertising department shows progress. Technical improvements in manufacture continue to be applied with satisfactory results, and the company's increased technical and manufacturing facilities have enabled it to obtain new contracts for various types of automatic selling machines. It has been necessary to make additions to factory premises and to plant and machinery in order to meet present requirements. The purchase of the business of Thomas Watson & Sons by the company has proved satisfactory to both parties.

Electric and General Investment Co., Ltd.

The gross profit for the year ended May 31st, 1929, was £13,175, to which is added £47,474 brought forward, making £60,649. The directors recommend placing £18,558 to reserve, repayment of balance of non-interest bearing income certificates at par, and the payment of dividends of 2s. per share on the ordinary shares, and 1s. per share on the deferred shares, leaving £20,024 to be carried forward. Meeting: July 9th.

Ward & Goldstone, Ltd.

The net profit for the year was £13,825, to which is added £29,805 brought forward, making £43,630. The directors propose to capitalise £8,000 for the purpose of issuing 32,000 fully paid ordinary shares of 5s. each to the holders of preference shares, and to pay a final dividend of 4 per cent. on the ordinary shares, making 11 per cent. for the year, leaving £25,688 to be carried forward.

W. T. Henley's Telegraph Works Co., Ltd.

The report for the year ended March 31st last states that the company's business continued to make satisfactory progress. The profit amounted to £354,567, against £342,291 in 1927-28. After meeting debenture interest, depreciation, &c., and adding a net balance of £529,931 and £2,369 transferred from reserve against trustee securities, there is an available amount of £826,537. Income tax is paid and £50,000 is transferred to reserve (as last year). The final ordinary dividend is 2s. 6d. per share, again making 4s. for the year, but the bonus is increased from 1s. to 2s. per share. The improvement in Henley's Tyre & Rubber Co., Ltd., continued during the year. To celebrate the company's fiftieth year it is proposed to give a cash bonus to all the hourly paid workers who had served for not less than one year at March 31st last, in addition to the bonus regularly paid to the salaried staff. Meeting: July 12th.

Lisbon Electric Tramways, Ltd.

The annual meeting was held on June 27th, Mr. L. Breitmeyer (chairman) presiding. In presenting the report and accounts, the chairman said that although the year had been an uneventful one, it had been one of steady progress, and nothing of any importance had transpired to interfere with the continuous operation of the service. The traffic returns showed that 112,874,963 passengers were carried, an increase of 8,293,536, as compared with the preceding year. They could look forward to the future with confidence, as the business would still further expand with the normal growth of the city. The report and accounts were adopted.

Marconi's Wireless Telegraph Co., Ltd.

The directors have decided to postpone payment of the half-yearly dividend on the 7 per cent. preference shares until the merger plan has become operative and the necessary adjustments have been made in the share registers.

Companies Struck Off the Register.

The names of the undermentioned companies have been struck off the Register, and they are thereby dissolved:—

Aedon Portable Wireless, Ltd.

Bradwell Electric Wire and Engineering Co., Ltd.

Kensington and Knightsbridge Electric Lighting Co., Ltd.

The directors have declared an interim dividend of 9d. per share, less tax, on the ordinary shares on account of the year ending December 31st next.

Eastern Telegraph Co., Ltd.

A dividend at the rate of 3½ per cent. per annum, less tax, has been announced on the preference stock for the quarter ended June 30th.

Telegraph Construction and Maintenance Co., Ltd.

The directors have decided to pay an interim dividend of 6s. per share, free of tax, to all shareholders.

The Cable-Wireless Merger.

The directors of Cables & Wireless, Ltd., announced last week that the merger plan had become operative, a sufficient number of shareholders in each of the constituent companies having signified their assent.

French Companies.

The *Société d'Equipement des Voies Ferrées et de Grands Réseaux Electriques* records net profits of 5,045,000 fr. for 1928; the dividend is 20 per cent.

The *Compagnie Electro-Mécanique* reports net profits of 7,322,000 fr., including the balance forward, for 1928. The dividend is 9 per cent. and 363,000 fr. has been carried forward.

The *Société d'Appareillage Electro-Industriel* (*Petrier, Tissot et Raybaud*) reports net profits of 1,148,000 fr. for 1928, against 849,000 fr. in the previous year. The dividend is 22 fr. per old share and 19 fr. per new share.

The *Compagnie Française Thomson-Houston* has decided to pay a dividend for 1928 at the rate of 26.16 fr. per registered share and 23,52 fr. per bearer share, the net profit having amounted to 22,141,000 fr., while 6,116,000 fr. was brought forward. In the course of the annual report the directors state that the French electrical manufacturing industry as a whole could not develop or maintain its present position unless it revised its methods of production and continually renewed its plant. It was with this object that an agreement had been concluded with the Société Alsacienne de Constructions Mécaniques, and the Société Générale de Constructions Electriques et Mécaniques (the "Als-Thom") had been formed. The Thomson-Houston Co. had leased to the new company its works at Saint-Ouen, Colombes et Lecourbe, Jarville and Lesquin, together with plant and equipment, raw materials, manufactures, &c.

Stocks and Shares.

MONDAY EVENING.

STOCK Exchange markets are badly hit by the monetary stringency which developed in consequence of the huge exports of gold to Germany, and the uncertainty that prevails in connection with the financial outlook. Prices of investment stocks and shares have fallen sharply. The good-class issues suffered with the rest. On the other hand, and as a corollary to the fall in exchange, American industrials have strengthened. Notable rises have occurred in such shares as American Telephone and Telegraph, and in Internationals, American securities of all classes, investment and speculative alike, being favourably affected by the influence which depresses so severely the prices of stocks and shares on this side. Even such a first-class stock as the Central Electricity Board 4 per cent. debenture, recently issued at 83, has fallen to 2½ per cent. discount. British Power and Light £1 shares receded to 18s. 7½d. The offer, made under the Government ægis, of £5,000,000 Agricultural Mortgage 5 per cent. debenture stock at 100 met with a most meagre public response. There is a fear lest the Bank Rate may be advanced to 6 or 6½ per cent. on Thursday in this week, although the outlook changes with such daily frequency as to leave a strong measure of hope to the optimists who consider that such a step may yet be averted.

Electricity Supply.

The weakness amongst investment stocks has hardly affected the issues included in the electricity supply group. Shares in the London companies have remained tolerably steady. Those descriptions in which anything like a speculative account exists, have yielded ground, though only to a negligible extent—Northamptons, for instance, which had come up from 40s. a few weeks ago, to 54s. earlier in the present month, have gone back to 51s. This is a fair illustration of the movements which have taken place as a whole in this particular section. The possibility of the Government modifying the miners' employment hours led to a dullness in the shares of the Newcastle-on-Tyne, Midland Counties, and other companies concerned with the supply of electricity to mining districts. Interim dividend announcements have begun to make their appearance. The St. James' & Pall Mall declares its usual 9d. per share on the ordinary, the same as that of a year ago, and payable on July 27th. Kensington & Knightsbridge is paying 9d., as before, on July 20th. Edmundson's Electricity Corporation records a net profit showing an increase of £24,000 over that of the previous twelve months. A final dividend at the rate of 8½ per cent. brings the total distribution for the year to 8 per cent. The ordinary shares are held by the Greater London & Counties Trust. The company proposes to create a further 1½ million ordinary, raising the capital to £3,150,000. The price of the preference remains unchanged at 25s. Electric Supply Corporation have regained their recent loss, and are 2s. 6d. higher at 55s. ex dividend. Notting Hill preference at 11 show no quotable change, although the price is now ex dividend.

The Sixth Scheme.

Details of the sixth scheme of electrical reconstruction and development are now published. This scheme applies to Northumberland, Durham and the North Riding, and it is the last but two of those which, when completed, will form a complete network over England and Wales. It is thought that the two Scottish schemes—that is, for the Northern and the Southern parts—will be ready for announcement in the early part of 1930. The latest scheme deals with an area of 5,000 sq. miles, in which there is a population of over 2½ million people, and the towns served are largely concerned with the heavy trades of North-East England—coal-mining, shipbuilding, engineering, &c., together with wide tracts of agricultural land.

Provincial Companies' Shares.

In addition to the prices quoted overleaf, it may be mentioned that Egham and Staines are 36s. 3d., the new being 1s. less. Newcastle and District old shares stand at 29s. 9d., the new at 29s. Electrical Distribution of Yorkshire are quoted at 36s. 7½d. and Richmond (Surrey) at 46s. 3d. Atlas ordinary have gone back to 27s. 9d., the preference keeping steady at 23s. 6d. Isle of Thanets at 36s. 6d., and the preference at 26s. 6d., maintain their previous prices.

Cables & Wireless, Limited.

The Cables and Wireless merger is now complete, sufficient support having been secured from the holders of Marconi and the cable companies' stocks and shares to enable the plan to become operative. Had there been any public interest taken in the market, this consummation would probably have been succeeded by a strengthening of the prices of the securities. As things are, however, the matter has had no influence upon prices, which, if anything, are disposed to sag. The cable stocks keep fairly steady, Eastern ordinary remaining at 265. Shareholders in the Globe Telegraph and Trust Company have passed the necessary resolutions for widening the investment powers of the undertaking. Marconi shares are quiet; the ordinary have gone back to 76s. Dealings are expected to begin towards the end of this month in the new Cables and Wireless issues. It is said, however, that business is already going on in the new combine, and that the 7½ per cent.

ordinary are quoted at a trifle over 20s., the 5½ per cent. preference at about par. If this is the case, the prices are higher than they may be expected to start at in the Stock Exchange market, and those people who wish to buy the new securities will be well advised to await the proper market price.

Manufacturing Companies' Shares.

Brush ordinary shares have been converted into stock, and the latter is priced at 136, which corresponds to 27s. 3d. for the £1 shares. It remains to be seen whether the step will have the effect of adding flexibility, or of attracting public interest, to the issue. Henley's hold the rise that they secured on the increase to 30 per cent. in the dividend and bonus. Enfield ordinary have advanced to 4¼ per cent. Callender's and British Insulated keep strong at their improved price of 3¾. General Electrics are dull at 2 9/16, in spite of a sharp rise in Associated Electrical Industries to 2¼. Hall Telephone Accessories have declared an interim dividend of 4 per cent. The shares are quoted at 15s.

Telephone Manufacturing shares gave way to 4s., business being marked as low as 3s. 9d. upon the issue of a disappointing report. The shares are of the nominal value of 10s. each. It is proposed to form into a separate company the installation branch of the business. Aron Electricity Meter has passed the dividend on its ordinary shares, and the price is weak at a nominal 8s. 9d. Last year's dividend was 4 per cent. English Electric preference have gone back to 8s. 3d.: the 5½ per cent. sinking fund bonds are ex-dividend to-day, Monday, at 87. The 6 per cent. consolidated debenture hardened to 70. Chadburn's (Ship) Telegraph ordinary were not affected by last week's meeting, being quoted at about 2s. 6d.: the preference are 9s. ex dividend.

Hydro-Electrics.

From 40, the price of Hydro-Electrics jumped to 44 in half a day, the shares being in eager American demand. For some time past, any buying of Hydros has been met by liberal supplies of shares from Brussels. But the latter centre appears to have stopped selling, and the effect of the purchases became sharply apparent. The company's holdings of stocks and shares in a number of American utility corporations have greatly appreciated in price, and the support for Hydros is claimed to be a tardy recognition of this improvement. The rise in the common to 45½ has been followed by the "B" preferred going to 8¼. International Holdings, the stable-companion company, has been left rather in the background. The price of the shares is about 8¼. Brazilian Tractions strengthened to 60. International Telephone and Telegraph stock is 99. American Telephone and Telegraph rose to 229. Postal Telegraph 5 per cent. debentures are 85. British Columbia Power "A" shares are better at 47½, and the "B" rose to 31¼. Para Electric preference went back to 15s. The home traction issues are very quiet, the only quotable change this week being an improvement to 6s. 6d. in London United Tramways preference.

The Heavy Trades.

The depression amongst iron, coal and steel shares is reflected in a fall of 1s. 9d. to 62s. in Babcock & Wilcox. This serves to increase the yield on the money, on the basis of the last 15 per cent. tax-free dividend, to £4 16s. 9d. per cent. net, equivalent to 6 per cent. gross. With full trust stocks obtainable on a 5 to 5¼ per cent. standard of return, the investor asks for more than 6 per cent. from industrials, even of such merit as Babcocks. And if the hours of employment are to be altered in the mines, such a step might affect companies engaged in the engineering industry. Vickers and similar shares are dull. The projected trust, or combine, in the steel trade is the subject of a good deal of attention.

Combines and Villages.

From New York it is credibly reported that another big consolidation of interests is likely to take place amongst companies connected with the supply of electric power in the United States. According to this rumour, a new holding company is to be formed, with the idea of obtaining control over three large utility undertakings, and the next developments are awaited with no little interest, especially as protests are becoming vocal in the United States against the manner in which trusts and combines are spreading out in all directions. In which connection, it may be mentioned that the British Columbia Railway Company is said to have obtained control of the utility companies on Vancouver Island, with only two exceptions. Huge works are in course of construction for dealing with schemes for the supply of power, lighting, &c., in British Columbia.

Atkin's Manual.

The appearance of this well-known annual, produced by one of the leading firms in the Stock Exchange, comes at a timely moment, for its pages deal with all the electrical companies—as well as with many others—around whose shares there is now so close a coil of public attention. The book presents all the salient information in a manner peculiarly lucid and well-arranged. It includes particulars of electric lighting, power, traction, and equipment companies, at home and abroad. In the financial library, the volume may be deemed indispensable, using that overworked adjective in an austerely literal sense. The compilers do their work admirably well.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1927	1928.	Price July 1 1929.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	65/9	—	4 11 4
Brompton Ordinary	1	8½	8½	26/-	—	5 7 8
Charing Cross Ordinary	1	8½	8½	26/6	—	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8¾	8¾	26/6	—	5 5 8
City of London	1		10	33/3	—	4 4 6
do. do. 6% Pref.... ...	1		6	23/-	—	5 4 4
Clyde Valley	1		8	36/3	—	... ...
County of London	1	7½	10	56/-	—	3 11 5
do. do. 6% Pref.... ...	1	6	6	23/-xd	+6d.	5 4 4
Edmundson's 7% Pref.	1	7	7	25/-	—	5 12 0
Elec. Supply Corporation	1	11	11	55/-xd	+⅛	4 0 0
Kensington Ordinary	1	8	8	26/6	—	5 5 8
Lancs. Light and Power	1	7½	7½	29/-	—	5 3 5
London Electric	1	8½	9	28/-	—	5 0 0
Metropolitan	1	9	9	47/6	—	3 16 0
do. 4½% Pref.	1	4½	4½	17/6xd	+4d.	5 2 10
Midland Counties	1	6½	6½	24/6	−6d.	5 15 4
Mid. Elec. Power	1	15	8	37/6	—	4 5 4
Newcastle-on-Tyne Ordinary ...	1	6	6	27/-	—	4 9 0
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	11xd	+½	5 9 1
North Met. Elec. 6% Pref.	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	32/6	−1/-	4 18 4
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	—	2	—	... ...
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	24/3	−6d.	6 3 8
Yorkshire Elec.	1	8	8	37/-	+6d.	4 6 6

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	72	—	5 11 1
Metropolitan	,	3	3½	60½	—	5 15 8
do. District	,,	4	5	76	−½	6 11 7
Underground Electric	£1	5	7	29/-	—	6 1 9
do. do. Income ...	Bonds	6	6	110	—	5 9

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	103	—	5 16 6
do. Def.	,,	1½	1½	24½	—	6 2 5
Automatic Telephone	1	10	12½	2 1/8	—	6 1 1
Eastern Extension	10	10	10	26½	—	*3 15 6
Eastern Tel. Ord.	Stock	10	10	265	—	*3 15 6
Globe Tel. and T. Ord.	10	10	10	27½xd	—	*3 12 9
do. do. Pref.	10	6	6	11½xd	—	5 6 6
Great Northern Tel.	10	20	—	3 1/2	—	... ...
Indo-European	25	10	10	50½	—	*4 19 0
Marconi	10/-	10	20	76/-	−1/6	... ...
Marconi-Marine	1	12½	15	3½	—	4 12 4
Oriental Telephone Ord.	1	12	12	3 3/8	—	... ...
Western Telegraph	10	10	10	26½	—	3 15 6

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	8 7/16xd	—	8 0 0
do. do. 2nd Pref. ...	5	6	6	8½xd	—	8 11 6
do. do. 5% Deb. ...	Stock	5	5	74½	—	6 14 3
British Electric Traction Def. Ord.	,,	5	5	137/-	—	... ...
do. do. Pref. Ord.	,,	8	8	128xd	+1	6 5 0
Brazil Traction	100	7	8	60	+½	3 6 8
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	94½	—	5 5 10
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	11/6	—	... ...
London United Tram Deb. ...	Stock	4	4	60xd	—	6 13 4
Mexico Trams, 5% Bonds	—	5	5	75½	—	6 12 9
Mexican Light Common	100	Nil	Nil	74½	—	... ...
do. 7% Pref.	100	7	7	74½	—	9 8 0
do. 1st Bonds	—	5	5	77½	—	6 9 0
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	—	2½	−8/9	2 8 0
Babcock & Wilcox	1	13	15	62/-	−1/9	*4 16 9
British Aluminium Ord.	1	10	10	2½	−1/8	*4 0 0
British Elec. Transformer Pref. ...	1	7	7	13/9	—	9 6 8
British Insulated Ord.	1	15	15	3¾	—	8 17 4
Brush Ord.	Stock	10	10	136	—	7 7 1
Callenders	1	15	15	3⅞	—	8 17 4
do. 6½% Pref.	1	6½	6½	1½xd	−6d.	5 4 0
Crompton Parkinson Ord.	5/-	—	—	21	—	... ...
do. 8% Pref.	1	8	—	25/-	—	6 8 0
Edison-Swan 1st Pref.	1	7½	7½	25/9	—	7 1 2
do. 5% Deb.	Stock	5	5	84½xd	—	5 18 4
Electric Construction	1	7½	5½	18/9xd	+6d.	5 17 4
Enfield Cable Ord.	1	20	20	4½	+¼	4 9 0
English Electric	1	Nil	Nil	6/3	—	... ...
do. do. Pref.	1	8	Nil	7/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/-	—	5 13 1
do. Ord.	1	10	10	2 5/8	−1/8	3 18 2
Henley	1	25	30	6½	—	4 10 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber		Nil	Nil	15/-	—	... ...
Johnson & Phillips		10	—	36/3	—	5 10 4
Siemens Ord.	1	7½	7½	30/9	—	4 17 7
Telegraph Construction	12	10	10	23½	—	*4 19 9

* Dividends paid free of Income Tax.

Australian Imports and Exports.

Values for 1926-1927 and 1927-1928 Compared.

THE following figures showing the values of the imports of electrical goods into Australia in the fiscal year 1927-28 have been taken from the recently-issued official trade returns. The corresponding figures for the previous twelve months have been added for the purposes of comparison, and notes of increases or decreases are given. There is a brief reference also to Australia's electrical exports.

Imports.

	1926-27. £	1927-28. £	Inc. or dec. £
Arc lamps, except for kinematographs—			
Total	4,400	2,400	– 2,000
From United Kingdom	3,800	800	– 3,000
Batteries (storage) and accumulators—			
Total	867,000	730,000	–137,000
From United Kingdom	321,000	266,000	– 55,000
,, Canada	10,500	6,000	– 4,500
,, Denmark	17,500	25,500	+ 8,000
,, France	5,600	2,600	– 3,000
,, Germany	8,700	17,500	+ 8,800
,, United States	499,000	410,000	– 89,000
Cable and wire, covered with cotton—			
Total	30,000	26,000	– 4,000
From United Kingdom	29,000	25,000	– 4,000
,, United States	500	600	+ 100
Cable, telegraph and telephone, paper insulated, lead covered—			
Total	21,000	73,000	+ 52,000
From United Kingdom	18,700	71,000	+ 52,300
Other telegraph and telephone cable—			
Total	1,630,000	1,623,000	– 7,000
From United Kingdom	1,542,000	1,543,000	+ 1,000
,, Holland	16,000	15,000	– 1,000
,, United States	38,000	30,000	– 8,000
,, Germany	24,000	19,000	– 5,000
Carbon manufactures—			
Total	35,000	33,000	– 2,000
From United Kingdom	16,000	17,000	+ 1,000
,, United States	12,000	10,000	– 2,000
,, Germany	3,500	4,000	+ 500
Dynamo-electric machines—			
Total	1,041,000		—
From United Kingdom	599,000		—
,, Canada	11,000		—
,, Germany	27,000	See details	—
,, Holland	11,000	below.	—
,, Sweden	19,000		—
,, United States	339,000		—
,, Switzerland	24,000		—
Dynamo electric machines,—a.c.—			
Total	*	576,000	—
From United Kingdom	*	406,000	—
,, Switzerland	*	22,000	—
,, Germany	*	11,000	—
,, United States	*	110,000	—
Dynamo electric machines, d.c.—			
Total	*	366,000	—
From United Kingdom	*	256,000	—
,, Germany	*	22,000	—
,, Switzerland	*	15,000	—
,, United States	*	59,000	—
Dynamo electric machines, universal—			
Total	*	13,000	—
From United Kingdom	*	6,000	—
,, United States	*	5,000	—
Lighting plant (exclusive of batteries) having an internal combustion engine not exceeding 4 h.p., direct coupled to dynamo—			
Total	*	57,000	—
From United Kingdom	*	16,000	—
,, United States	*	39,000	—

* Not previously recorded separately.

	1926-27. £	1927-28. £	Inc. or dec. £
Fans, electric—			
Total	46,000	48,000	+ 2,000
From United Kingdom	13,000	9,000	– 4,000
,, Italy	14,000	18,000	+ 4,000
,, United States	14,500	15,500	+ 1,000
Switches, fuses and lightning arrestors—			
Total	415,000	375,000	– 40,000
From United Kingdom	288,000	280,000	– 8,000
,, Japan	300	100	– 200
,, United States	112,000	82,000	– 30,000
,, Germany	7,000	7,000	—
Heating and cooking appliances—			
Total	86,000	97,000	+ 11,000
From United Kingdom	24,000	28,000	+ 4,000
,, Canada	12,000	14,000	+ 2,000
,, United States	43,000	42,500	– 500
Lamps, filament—			
Total	615,000	575,000	– 40,000
From United Kingdom	314,000	300,000	– 14,000
,, Hungary	3,000	6,000	+ 3,000
,, Austria	22,000	16,000	– 6,000
,, Holland	196,000	181,000	– 15,000
,, United States	50,000	52,000	+ 2,000
Measuring and recording instruments—			
Total	156,000	162,000	+ 6,000
From United Kingdom	87,000	81,000	– 6,000
,, Switzerland	15,000	17,000	+ 2,000
,, United States	44,000	45,000	+ 1,000
,, Canada	5,500	16,000	+ 10,500
Regulating and controlling apparatus—			
Total	364,000	327,000	– 37,000
From United Kingdom	250,000	206,000	– 44,000
,, United States	98,000	106,000	+ 8,000
,, Switzerland	4,000	2,700	– 1,300
,, Canada	6,000	5,000	– 1,000
Static transformers and induction coils—			
Total	211,000	180,000	– 31,000
From United Kingdom	114,000	128,000	+ 14,000
,, Sweden	10,000	9,500	– 500
,, United States	65,000	21,000	– 44,000
Telegraph instruments and appliances—			
Total	44,000	18,000	– 26,000
From United Kingdom	30,000	17,000	– 13,000
,, United States	14,000	1,000	– 13,000
Telephones —			
Total	158,000	106,000	– 52,000
From United Kingdom	133,000	81,000	– 52,000
,, Sweden	2,500	600	– 1,900
,, United States	19,000	19,000	—
,, Germany	1,300	1,600	+ 300
Telephone switchboards and appliances—			
Total	533,000	732,000	+199,000
From United Kingdom	363,000	601,000	+238,000
,, Belgium	37,000	49,000	+ 12,000
,, Sweden	5,000	1,300	– 3,700
,, United States	127,000	76,000	– 51,000
Vacuum tubes, electrical—			
Total	6,700	23,000	+ 16,300
From United Kingdom	500	6,700	+ 6,200
,, Holland	1,000	6,500	+ 5,500
,, United States	5,000	9,000	+ 4,000
Wireless receiving sets, including loud speakers and wireless parts†—			
Total	423,000	376,000	– 47,000
From United Kingdom	145,000	119,000	– 26,000
,, France	14,000	7,000	– 7,000
,, Germany	10,000	22,000	+ 12,000
,, Holland	6,000	18,000	+ 12,000
,, United States	246,000	208,000	– 38,000

† For 1926-27 includes wireless receiving sets only.

	1926-27. £	1927-28. £	Inc. or dec. £
Valves for wireless telegraphy or telephony—			
Total	224,000	179,000	– 45,000
From United Kingdom ...	86,000	64,000	– 22,000
,, Holland	60,000	59,000	– 1,000
,, United States ...	76,000	53,000	– 23,000
Electrical appliances, n.e.i.—			
Total	528,000	415,000	–113,000
From United Kingdom ...	292,000	237,000	– 55,000
,, Canada	9,000	7,600	– 1,400
,, Denmark	3,000	1,000	– 2,000
,, Germany	29,000	37,000	+ 8,000
,, Japan	1,800	800	– 1,000
,, United States ...	179,000	114,000	– 65,000
,, Switzerland ...	2,000	4,700	+ 2,700
Electrical insulating paper and boards—			
Total	26,500	26,400	– 100
From United Kingdom ...	10,500	14,000	+ 3,500
,, United States ...	10,900	5,600	– 5,300
Electrical ware of earthenware, including insulators—			
Total	51,000	31,000	– 20,000
From United Kingdom ...	12,000	4,000	– 8,000
,, Canada	1,800	1,400	– 400
,, Japan	4,000	3,800	– 200
,, United States ...	31,000	16,000	– 15,000

Exports.

Australia carries on a small export trade in electrical goods of her own manufacture. Below are given the comparative values in 1926-27 and 1927-28 :—

	1926-27. £	1927-28. £	Inc. or dec. £
Electrical machinery and appliances—			
Total	162,000	59,000	–103,000
To New Zealand	62,000	16,000	– 46,000
,, Fiji	3,000	—	+ 3,000
,, New Guinea	5,000	1,000	– 4,000
,, India	12,000	600	– 11,400
,, France	27,000	17,000	– 10,000
,, British Malaya	1,000	18,000	+ 17,000
Other electrical materials—			
Total	45,000	16,500	– 28,500
To New Zealand	21,000	12,000	– 9,000

Foreign Trade Inquiries.

Some Regular Problems which Beset the Manufacturer.

(COMMUNICATED.)

THE question of salesmanship as applied to foreign trade has received a considerable amount of attention since the recent pronouncement of the Prince of Wales upon this subject. It is one of perennial interest, as there is no branch of modern commerce which is more full of surprises than the export side. Many of the problems which beset the manufacturer in the transaction of export business are of regular occurrence, and the questions upon which an exporting maker has to give a decision are to a great extent the same, irrespective of the exact branch of his productions. Although the greater portion of all export trade is transacted under various forms of agency arrangement, every manufacturer will be familiar with a class of proposal which he receives periodically from one country or another. It is a proposal giving news of some large order or another which is to be secured, and suggests that he should only treat this particular business through the medium of the inquirer. The transaction in question may be the equipment of a railway workshop, a complete foundry installation, or it may be merely some special form of machine tool which is required. In any case, however, the dealer who forwards particulars of the affair usually claims to be in an unequalled position for securing the business when it is placed, and suggests that the manufacturer should only quote for the job through him in order to avoid the possibility of complications. As the problem is one of such regular occurrence, it is interesting, without making any attempt to present a ready-made solution, to examine the suggestion in some of its aspects which do not invariably receive the attention they deserve.

What Does the Manufacturer Get?

It is apt to be assumed that if no previous news has been received of the business which is in question, that here is a fortunate discovery of a dealer who will go out of his way to act as an agent by introducing the manufacturer exclusively to an important order which the former will probably secure. The assumption is pardonable from the way in which the suggestion is usually put, but to what extent is it really correct?

In the first place, it is worth bearing in mind that in the suggestion as put forward there is no offer whatever in so many words that the dealer intends to limit his efforts or his chances of securing business by putting forward exclusively the products of the one manufacturer. It is further worth noting that in the case of machinery, respecting which the suggestion is usually made, the number of manufacturers producing exactly the type which is required is strictly limited. The suggestion, for instance, would be frequently made in respect of a somewhat special form of honing machine, but not in connection with an ordinary plain grinder. The suggestion would be familiar to makers of large transformers, but it would hardly be made to the more numerous producers of the small l.f. transformers for radio work. In cases where the suggestion is usually made, it is often possible to calculate whether if the dealer or agent succeeded in obtaining an undertaking from about half-a-dozen manufacturers that they would only quote for the business through him, he would be in a fair way to establishing a very effective corner in the business! It will be noticed, on examining the suggestion more closely, that although the manufacturer is asked to handle the business only through the dealer, there is no undertaking that the latter will confine himself to the single manufacturer by putting forward a single make of machine, nor, in fact, is there any effective check or safeguard to ensure that he puts forward a particular machine at all at a price which is likely to secure the business.

The Manufacturer's Position.

It is also advisable to give some thought to the manufacturer's position in case he should receive the same inquiry a little later from other merchants, as in such cases he is reasonably certain to do. It does not impress inquirers too favourably to find that although a maker advertises a certain type of machine, yet when one passes him an inquiry there seems to be always some unanswerable reason or excuse why it is not possible to quote for it. Such a reputation is often far easier to acquire than to live down! The position in this respect was very well put in an explanation given by one well-known firm with trade connections in many countries, which is worth quoting in this connection. They say :

" On a point of policy, we regret that we cannot see our way to undertake only to quote for certain business through a particular firm. You will perhaps appreciate our position in this matter a little better if we point out that the granting of such requests, which upon this occasion would confine us to you for the business you mention, might conceivably in a couple of months' time result in our having to refuse to quote you for the next inquiry you send us, simply because a firm in competition with your own happened to have approached us a couple of days earlier, and obtained from us a similar undertaking to the one for which you are now asking! We will readily agree not to quote anyone a lower price for this job than we are quoting you, and if there is any concession made to another inquirer either in price or in terms before this order is finally placed, we will also give you the benefit of such concession, but we regret that we cannot undertake only to treat the business through your firm for the reasons stated."

A Time Limit.

Further, in transactions of this nature it is not always appreciated how important it is that there should be a time limit to the arrangement. Few people would think of entering into an agency arrangement or a lease without a term being defined, yet an arrangement to pay commission to a third party upon business secured from a certain user is frequently given without any such essential qualification. As a slight variation of the suggestion previously referred to, a dealer in a foreign country may propose to the manufacturer to introduce a certain type of machine to a works or user in

his territory, and ask that such business shall be treated through him or commission credited. The suggestion is a reasonable one, but the undertaking is frequently given without a time limit. The initial effort may fail, but three or four years afterwards another agent or a traveller may again introduce the same type of machine to the same works, and by means of better salesmanship may secure an order long after the first negotiations have been forgotten. It is difficult in such a case to convince the original dealer that the business has not followed simply and solely as a direct result of his efforts in the past, and it is seldom that the outcome of the dispute upon this point is satisfactory to all parties.

Every maker has to decide his policy in such matters in the manner which is found most profitable to the business concerned, but it will be found that it clears the ground considerably, and greatly facilitates a correct decision, if information is obtained upon the following points:—

(1) Is it proposed to put forward the one make of machine exclusively; if not, what other makes are also being quoted?

(2) Is it understood that the same inquiry will not later be communicated to other makers?

(3) Is it known that the inquirer is really in a position to influence the placing of the order in question?

(4) Is it understood that the undertaking (if given) is to cease automatically in three months' time unless the arrangement is extended by mutual consent?

(5) Is it proposed to keep the manufacturer informed of the steps which are taken to secure the order, the price quoted, &c.?

The Cockle Creek Power Station.

A brief description of the salient features of new central electricity generating plant of a large colliery undertaking in New South Wales, Australia.

(COMMUNICATED.)

A NEW electricity generating station has recently been built by the Caledonian Collieries, Ltd., of Newcastle, New South Wales (chairman and managing director: Mr. H. B. Howard-Smith) which owns the largest collieries in the whole of Australia, and for which Messrs. Howard Smith, Ltd., Sydney, N.S.W., act as managing agents, for the purpose of satisfying its own collieries' requirements as well as supplying electricity to a number of outside consumers.

Situated between the Barnsley and Cockle Creek stations on the Newcastle to Sydney line of the N.S.W. Government railway, the new station has taken the place of a number of medium-sized sets of plant, each of which was located at a particular colliery, and the installation of the central plant has thus reduced the cost of generation considerably. Due to the importance that is attached to continuity of supply, the whole plant has been arranged in duplicate. Moreover, having regard to the nature of the country the transmission line has to cross, which is subject to frequent bush fires, the whole of the line has been erected on steel towers, and in order to further safeguard the plant against involuntary shut downs caused by line failure, insulators have been used which are rated in excess of the usual value for the particular voltage employed. The results obtained since the plant was started have fully justified the additional expense that the above policy involved.

The power station is situated adjacent to Cockle Creek, from which salt water for condensing purposes is pumped. The building is of reinforced concrete with brick panelling, fig. 1, ample provision having been made for extensions as required.

The plant at present installed includes two 5,000-kW 3-phase 50-cycle turbo-alternators generating at 6,600 volts. Steam is supplied by two Babcock & Wilcox c.t.m. boilers, each with a heating surface of 8,619 sq. ft., fitted with superheaters having a surface of 2,240 sq. ft. and Green tri-tube economisers of 4,874 sq. ft. The condensing water gravitates from Cockle Creek through the necessary screens to circulating pumps, thence through the condensers, and is discharged by gravity race into an adjacent swamp.

The boiler plant has been arranged for economical firing with low-grade fuel, and as large quantities of unsaleable pit waste are available adjacent to the station the generating cost is low; furthermore, in the event of industrial trouble, continuity of operation is thus assured.

The electrical pressure is stepped up at the station from a generating pressure of 6,600 volts to 33,000 volts by an outdoor sub-station, also arranged in duplicate; thence the electricity is transmitted to sub-stations at the various collieries. The overall length of the main transmission line is 20 miles. A secondary transmission line operating at 6,600 volts feeds two of the Company's collieries and outside consumers in the same district near the power station.

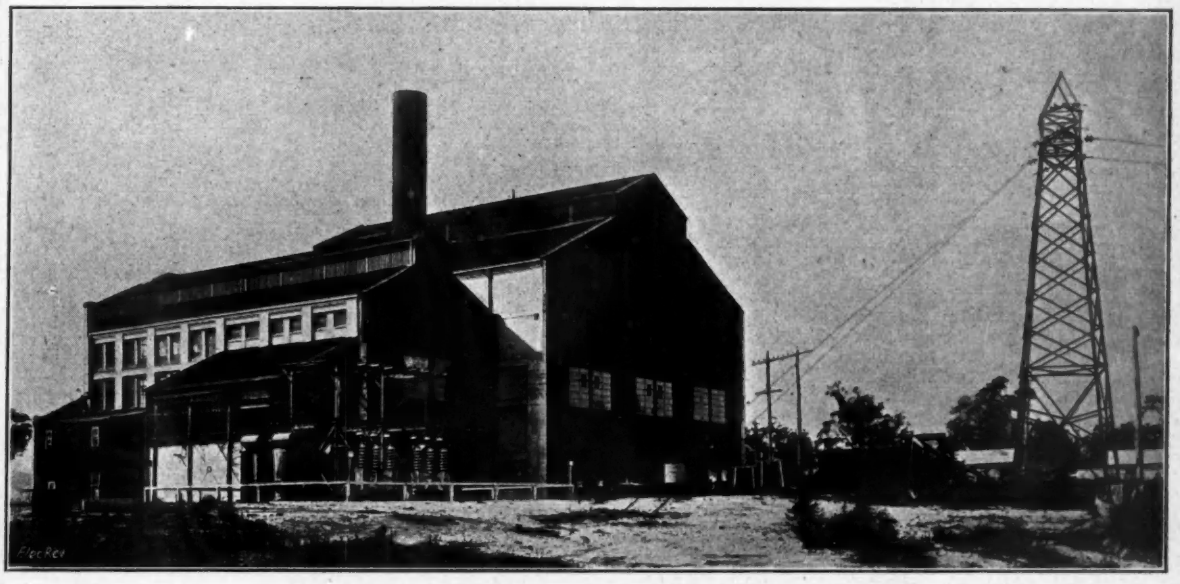


Fig. 1.—The Cockle Creek Electricity Generating Station.

An unfailing supply of fresh water of a quality suitable for boiler feeding without treatment is available, and the conditions of fuel supply, condensing water, fresh water, &c., indicate that this undertaking is one which should grow. The fact that the station has been in operation continuously for the last two years indicates that the supply is reliable. At present there is an ample margin of power for sale to outside consumers, particularly as there is a wide area of land in the vicinity that is eminently suitable for development in the rapidly progressing industrial centre where are already situated the iron and steel smelting works and rolling mills of the well-known Broken Hill Proprietary Co., Ltd., the wire netting works of Lysaght Bros. & Co., Ltd., the wire and nail works of Rylands Bros. (Austr.), Ltd., the railway wheel and axle works of Vickers-Commonwealth Steel Products, Ltd., Australian Wire Ropes, Ltd., the Sulphide Corporation, Ltd., cement works, &c.

The design and construction of the whole of the power station and transmission system was under the supervision of the consulting engineer, Mr. J. E. Donoghue, M.I.E.E., M.I.E.Aust., M.Am.I.E.E. (London).

North-East England Electricity Scheme.

An outline of a scheme prepared by the Electricity Commission and transmitted to the Central Electricity Board.

THE North-East England Electricity Scheme, prepared by the Electricity Commission in pursuance of Section 4 of the Electricity (Supply) Act, 1926, has been transmitted to the Central Electricity Board and was published by the latter on June 26th.*

It is the sixth scheme of its kind† and applies to an area of about 5,050 square miles (delimited on the accompanying map, fig. 1) including the counties of Northumberland and Durham and a part of the North Riding of Yorkshire. The area had a population at the last census of approximately 2,674,800 people, and embraces densely populated industrial districts in which the coal-mining, shipbuilding, iron and steel, engineering, and chemical trades normally flourish.

Electricity Districts have not been delimited in the area, which extends from the Scottish border southward to the northern boundary of the Mid-East England area; eastward it extends to the North Sea coast and westward to the boundary of the North-West England and North Wales scheme

Fig. 1.—Map of N.E. England Area.

area. It also includes wide tracts of agricultural territory which, with a few isolated exceptions, are at present unprovided with any system of electricity supply.

At present there are 32 authorised electricity supply undertakers in the area, owning between them 15 public generating stations. The consumption of electricity in 1927-28 was about 247 kWh per head of the above-mentioned population. It is estimated that this figure will increase to an average of 410 kWh in 1935-36.

The scheme proposes that six of the existing stations will be "selected" and operated for the Central Electricity Board, namely, those of the Newcastle-upon-Tyne Electric Supply Co., Ltd., at Carville (A) and (B), Dunston, and North Tees, and the municipal stations at Darlington and Sunderland.

It is not anticipated that any new stations will be required, but the scheme provides for further stations to be worked under temporary arrangements for a few years. Several waste-heat and private generating stations are connected to the systems of undertakers in the area, and it is assumed that those undertakers will continue the arrangements already entered into with the owners of those sources of supply. Broadly, four of the "selected" stations, namely, Carville (A) and (B), Dunston and North Tees, will supply the base load, while the remainder will be used for meeting the peak load. It is thought that in due course it will be possible to reduce the number of peak-load stations required.

The "selected" stations will be extended by the addition of 3-phase, 50-cycle, generating (and the equivalent boiler) plant as and when specified below:—

(i) Carville (A), three additions of 25,000 kW each by the winters of 1932-33, 1934-35, and 1935-36.

(ii) Carville (B), three additions of 25,000 kW each by the winters of 1938-39, 1939-40, and 1940-41.

(iii) Darlington, an addition of 25,000 kW by the winter of 1937-38.

(iv) Dunston, two additions of 35,000 kW each by the winters of 1936-37 and 1937-38; and three further additions of 50,000 kW each by the winters of 1938-39, 1941-42, and 1042-43.

(v) North Tees, two additions of 25,000 kW each by the winters of 1940-41 and 1942-43.

As a temporary arrangement the under-mentioned generating stations will continue to operate for such periods as they may be required:—Carville (A) and (B), Dunston and North Tees [N.E.S. Co. (existing 40-cycle plant)]; Close (Newcastle and District E.L. Co., Ltd.); Darlington Corporation; Grangetown (Cleveland and Durham County E.P. Co.); Manors (Newcastle Corporation); Scarborough Corporation; South Shields Corporation; and Sunderland Corporation.

The stations will be interconnected by a series of high-pressure main transmission lines designed in a series of ring mains, so that there will be alternative routes to points of supply and consequently greater security against breakdown. The ring mains are not necessarily completed in the present scheme, but the primary transmission system has been laid out (see fig. 1) so as to permit of amplification hereafter under schemes for adjoining areas. The main transmission system will comprise 102 route miles of line and five transforming stations varying in capacity from 20,000 to 90,000 kVA. The secondary transmission system will involve a further 10 transforming stations varying from 600 to 30,000 kVA in capacity. Incidentally, the interconnection of the stations will result in the release for revenue-earning purposes of about 80,000 kilowatt of plant now kept as spare and representing about £1,360,000 of capital.

The transmission lines will be 3-phase, 50-cycle, mainly overhead: the primary ones will operate at 132 kV between phases and be each capable of transmitting not less than 50,000 kW, while the secondary lines will operate at 33 kV, or some other approved voltage.

The greater part of the electrical development in this area has been carried out on a non-standard frequency of 40 cycles. The scheme contemplates standardisation in 25 undertakings, the work being carried out over a period of years in stages and in such manner that no further 40-cycle generating plant beyond that already sanctioned will be installed in the area of the scheme by the undertakers concerned. The estimated eventual cost of standardisation is £5,963,070. The change over to the 50-cycle 3-phase system is to be carried out in accordance with a programme to be agreed between the Board and the owners of the systems to be converted, or, failing agreement, to be determined by an engineer to be appointed by the Electricity Commission.

The cost of the scheme to the Board for the erection of the transmission system is estimated at £1,131,467. In addition, there will be an expenditure by undertakers of about £775,000 on extensions of certain existing stations. It is estimated that the full advantages of the scheme can be secured with a saving of about £2,040,958 on capital expenditure (up to the year 1935-36), as compared with the capital expenditure that would be necessary if the present system were continued. After that date the saving on capital expenditure should be progressively greater, as compared with individual development.

The Commissioners have outlined a provisional plan of working the stations with the necessary estimates, which suggestions are, of course, tentative, since the working of the scheme, including the fixing of tariffs, is the responsibility of the Board; but, taking the figures as they stand, it is interesting to note that the Commissioners estimate that in the five years 1931-36 there will be a saving to the undertakers in the area of about £382,173.

* Copies of the scheme, with map (1s. 6d. each), and of supplementary particulars (3s. 6d. each) are obtainable from H.M. Stationery Office.

† See Elec. Rev., January 25th, 1929, p. 168.

Applications of A.C. to Electro-deposition.

A report of a novel paper and discussion thereon before the Electroplaters' and Depositors' Technical Society.

A SUBJECT of unusual interest was treated of by Dr. H. C. Cocks in a paper read recently before the Electroplaters' and Depositors' Technical Society. An interesting discussion followed the reading of the paper.

After dealing with electrolysis by a.c. alone, the author described electrolysis by means of superposed a.c. He said the best method of superposing a.c. on d.c. was that used by Cooper Jones and others. The a.c. was passed through the primary winding of a transformer and the d.c. source and electrolysis cell were connected in series with the secondary coil; a.c. was induced in the secondary coil, and was thus superposed on the d.c. flowing in it. A battery of accumulators was a convenient source of d.c.; they did not appear to be appreciably affected by the passage of the a.c. through them. Other methods, such as those in which auxiliary a.c. electrodes were used, had the disadvantage that there was usually some leakage of a.c. into the d.c. circuit and *vice-versa*. The d.c. component of the superposed current could be measured by a moving-coil ammeter, while the a.c. component could be calculated from the reading of a hot-wire ammeter placed in the same circuit. The reading of the hot-wire ammeter was the square root of the sum of the squares of the a.c. and d.c. components of the current.

The action of superposed a.c. in a process might be looked at from two points of view. One way of considering it was to imagine the electrolysis taking place by a.c. alone, and then to visualise the changes which should occur when one pulse of the current was made of greater amplitude than the other. The other way of considering the action was to look upon it as d.c. electrolysis being modified by the superposed a.c. In considering it from the second point of view it must be remembered that, providing the ratio of the a.c. to the d.c. was greater than 0.707 : 1, an electrode which was the cathode in the d.c. process would periodically tend to become the anode and *vice-versa*.

The important conclusion to be drawn from work which had been done on the subject was that the superposition of a.c. on a d.c. electrode process tended to reduce any irreversibility in that process ("The Principles of Applied Electrochemistry," Allmand and Ellingham, p. 147). The superposed a.c. acted as a depolariser: it reduced anode and cathode polarisation and electrochemical passivity, and was therefore most likely to be of use for the electro-deposition of metals in cases in which a reduction of polarisation was required. Those statements were probably only true when the a.c. component of the current was greater than 0.707 of the value of the d.c. component. Chemical depolarisers might leave undesirable decomposition products in the electrolyte, but superposed a.c. would not.

In the electro-deposition of metals hydrogen overvoltage was usually of importance, and the fact that Goodwin and Knobel found that it could be greatly reduced by the superposition of a.c. was of interest. The oxygen overvoltage and electrochemical passivity of anodes could also be markedly reduced by the superposition of a.c. That the effects of superposed a.c. had been found to increase with the ratio of the a.c. to the d.c. and to decrease with an increase of frequency had already been mentioned. In certain cases, however, an a.c. of very high frequency might possibly have a greater effect than one of low frequency.

It should be pointed out that the superposition of a.c. in processes involving the electro-deposition of metals might affect (probably adversely) the throwing power of those processes.

Regarding the work which had been done on the effects of superposed a.c. in processes involving metal deposition, one of the most promising of the possible applications of superposed a.c. was its use in nickel deposition. Kohlschütter and Schödl had published two papers on the effect of superposed a.c. on nickel deposition. The first dealt with the effect of the superposed current on the structure, contractibility and bendability of nickel deposits, and the second with its influence on the deposition and solution potentials of nickel. Their investigations were a continuation of those of Kohlschütter and Vuilleumier, and Stäger. The former two had investigated the deposition of nickel with the object of finding an experimental connection between the polarisation and the structure of electrolytically-deposited metals. They studied the internal tension of nickel deposits by depositing the metal on a thin platinum sheet and noting the bending of the sheet, and concluded that nickel was probably first deposited in a highly dispersed form, and then the particles sintered with the formation of a denser metal. This probably occurred, together with the formation of a gas layer on the cathode which played the part of a dispersion medium. Since the electrolytic solution pressure of the highly dispersed form was greater than that of the denser metal, that view explained the increase in the deposition potential above that of the normal metal. Stäger had found that chemical depolarisers, such as hydrogen perozide and nitrobenzene, an increase of temperature, and the superposition of a.c. effected a distinct structural alteration in nickel deposits, and strongly reduced the tendency to contraction.

The influence of superposed a.c. was particularly marked, and permitted of the deposition of smooth contracted nickel at the cathode. The effect of a.c. was regarded as a reduction of the hydrogen charge of the cathode, *i.e.*, depolarisation. Kohlschütter and Schödl investigated the deposition of nickel from solutions consisting mainly of nickel chloride, nickel ammonium chloride, nickel sulphate, and nickel ammonium sulphate, using d.c. alone and a superposed a.c. of 40 cycles. By depositing the nickel on the platinum of a contractometer they measured on an arbitrary scale the contraction of the deposits obtained under various conditions. The superposition of a.c. was found greatly to reduce the contraction of the nickel, the effect, under otherwise constant conditions, increasing with an increase of the ratio of a.c. to d.c. Great differences were observed between the structure of the deposits obtained with d.c. and with superposed a.c. That of the former could not be discerned when examined by means of a low-power microscope, while the latter deposits showed a flaky structure, and resembled well-contracted deposits. After equal times of deposition and with the use of the same current density, the contraction was not so great in nickel ammonium sulphate as in nickel ammonium chloride solutions. With d.c. alone hydrogen evolution occurred mainly during the first few minutes of, but with superposed a.c. it continued throughout, the time of deposition and increased with an increase of current density. They also studied the deposition of nickel on copper; when deposited from a solution of nickel ammonium chloride, the current efficiency was from 92 to 98 per cent. with d.c. alone, but with superposed a.c. it was slightly lower, and decreased with an increase of the ratio of a.c. to d.c. With a.c. to d.c. = 10 : 1 it was from 80 to 94 per cent. In sulphate solutions the current efficiency for nickel when using superposed a.c. was appreciably lower than with d.c. alone; it fell to as low as 25 per cent. with a large a.c. to d.c. ratio. The deposits on copper obtained by the use of superposed a.c. were also clearly distinguishable from those obtained with d.c. alone. The deposits with d.c. had a fine-grained structure, but when superposed a.c. was used the grains gradually became coarser with an increase of the ratio a.c. to d.c. With a ratio of 2 : 1 the deposits usually possessed a velvety glance on a rough-grained surface, while with d.c. only they had a reflecting surface with a slight brownish tint and slight outgrowths at the edges. With a lower a.c. to d.c. ratio the deposits were often reflecting, but with higher ratios, rough, matt, surfaces were obtained. The deposits on copper were easily differentiated on bending; those obtained with d.c. from chloride solutions broke with every little bending, while those obtained with superposed a.c. broke only on repeated bending. The d.c. deposits from sulphate solutions were somewhat less brittle than the corresponding ones from chloride solutions, yet they generally broke after bending once or twice, while those obtained with superposed a.c. were very bendable. The inside of thick layers of nickel (unlike the surface) showed no great difference of structure according to whether they were deposited with d.c. or superposed a.c. Kohlschütter and Schodl also measured the deposition and solution potentials of nickel with d.c. alone and with superposed a.c. That part of the work was carried out to see if a direct relationship could be established between the deposition potential and the structure and tendency to contraction of the deposits. They found that the deposition potential was decreased by the superposition of a.c., *i.e.*, depolarisation occurred, and that the effect became greater the larger the ratio of a.c. to d.c.; with a large ratio, the deposition potential was lowered by about 0.25 volt. The anode polarisation was found to be decreased in a similar, but more pronounced, way, the decrease amounting to about 0.5 volt in certain cases. The voltage across the cell was reduced by an amount which was approximately the sum of the decreases of polarisation at the cathode and anode. They concluded that the relationship between the tendency of the deposits to contraction, their structure, and the deposition potential was not so close as might at first appear, although there was general parallelism between the lowering of the deposition potential and the decrease in the tendency to contraction which resulted from the superposition of a.c.

That work on the reduction of the internal stress of nickel deposits by the superposition of a.c. was being continued and extended by Mr. R. H. D. Barklie in the course of investigations carried out under the supervision of Prof. Sesch for the Department of Scientific and Industrial Research at Sheffield University.

Tuckel and Loesch carried out some work on the use of superposed a.c. in nickel deposition. They measured anode and cathode current efficiencies when using d.c. alone and superposed a.c., but gave no details of the appearance or structure of the cathode deposits. They stated that nickel deposits obtained from nickel ammonium sulphate solutions

were harder and more durable than those produced in chloride solutions, and that the use of nickel ammonium sulphate solutions necessitated the use of impure anodes, because anodes of pure nickel did not corrode well and tended to become passive. They pointed out the objections to the use of impure nickel anodes, and showed by their experiments that pure anodes could be made to corrode well in nickel ammonium sulphate solutions by superposition; for example, by the superposition of a.c. of a sufficiently large value, the d.c. efficiency for the solution of nearly pure rolled nickel anodes was raised from below 5 to over 80 per cent.; of sandblasted electrolytic nickel anodes from 27 to over 100 per cent.; and of smooth electrolytic nickel anodes from 50 to over 100 per cent. The d.c. density was from 8 to 14 amperes per sq. ft.

The only case of the technical use of superposed a.c. in electrolysis was that of the Wohwill modified gold-refining process. (B.p.6276, 1909.) In the ordinary Wohwill process crude gold anodes containing silver and small quantities of other metals were refined by means of d.c. in a bath containing gold chloride and hydrochloric acid. At low-current densities the gold dissolved and a layer of silver chloride formed on the anode. The coating had to be removed mechanically from time to time, otherwise the current density at the free gold surface would be increased and chlorine evolved instead of gold being dissolved. The higher the silver content of the alloy the more frequently must the anodes be scraped clean, or the lower must be the current density used. It was important that the alloy should be refined as quickly as possible, owing to the highest charges on the precious metal, hence the use of a low-current density was a great advantage in the process. In the modified process used for alloys containing more than 6 per cent. of silver, that and other disadvantages were largely overcome. When a sufficiently large a.c. was superposed, the d.c. density could be considerably increased; the silver chloride did not form an adherent coating on the anodes, and thus there was no need to scrape them. The bath voltage was reduced and the percentage of gold in the "slimes" was considerably decreased. With superposed a.c. the cathodically-deposited gold could be obtained in a coherent form when high d.c. densities and cold solutions were used, while with d.c. alone such was not the case. The modified process was, or had been, used in United States mints. The saving in interest charges more than compensated for the cost of the a.c.

Mr. D. MACDONALD gave an interesting account of the use of superposed a.c. in the modified process for refining gold, the particular plant described consisting of sixty cells fed by two motor-generator sets and two motor-alternator sets, each of about 45 h.p. The dynamos and alternators were arranged in series, and the capacity of the plant was about one ton per two days. By superposing a.c. whose r.m.s. value was 10 per cent. greater upon the d.c., asymetrically alternating current was formed which produced a powerful anodic wave, followed by a weak cathodic wave. The current density used was on the average 8.5 amps. per sq. ft., and the frequency of alternations at least 50. The effect of the a.c. upon the solution of the anode was immediate; instead of the current dropping to half its original value in a couple of hours due to the coating of silver chloride which formed, as occurred when a.c. was not used, and in fact eventually ceasing altogether, when a.c. was employed the current was maintained until disintegration of the anode occurred 24 hours later. The silver chloride then formed a loose coating, which dropped away and did not interfere with the passage of the current.

Mr. D. J. MACNAUGHTAN said that the scope for using superposed a.c. in electro-deposition was not very great at present. For example, in nickel plating the passivity of the anodes which could be overcome by a.c. could be definitely overcome in a much simpler way by the use of chlorides in the solution. Similarly, stress in the nickel deposit which could also be reduced by employing a.c. might easily be reduced by raising the temperature of the solution. Nevertheless, it was possible that a.c. might prove to be of increasing value to the plater as more precise knowledge was forthcoming.

Mr. E. A. OLLARD said it was quite possible that there might be a useful field for a.c. in future, and when the time arrived it would no doubt be found possible to design apparatus of the right kind to give the type of pulsating current required. It was important that investigators into the effect of a.c. should make a practice of describing the deposits which they obtained, as often they were treated as of secondary importance. It would be useful to try an interrupted d.c. and also a d.c. missed at intervals by means of a commutator, as that would give larger periods in one direction than in the other.

Mr. G. E. GARDAM said that the results obtained in the deposition of a nickel-zinc alloy could be obtained on the basis of rapidly varying current density. He wondered if it would in a similar way be possible to obtain an alloy of zinc and copper from a solution of their mixed sulphates by superimposing a.c. on d.c., thus realising the "acid brass" bath.

Overhead Lines in India.

An Example of an Electricity Transmission Scheme recently carried out by a British Company.

LONG before the uses of electricity began to enter into the lives of the people of India, monuments to the skill of engineers in the form of water, drainage, and irrigation works had contributed to their health and prosperity. Agriculture being one of her principal industries,

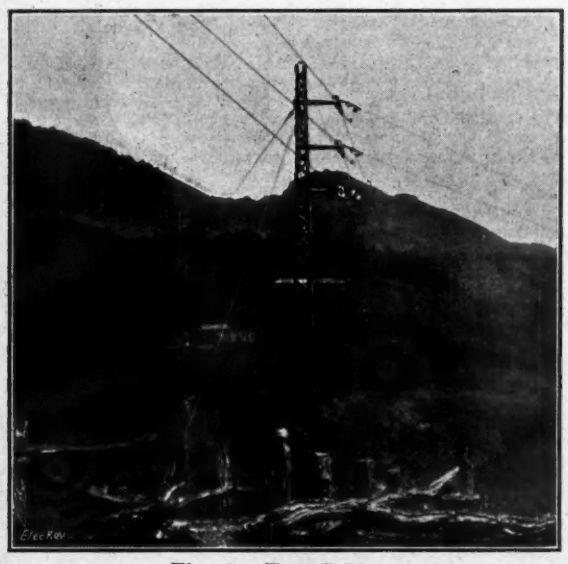


Fig. 1.—Tee-off Mast.

extensive canals have been excavated for irrigation purposes. Cotton and jute mills afford occupation for a large number of operatives, besides hemp, woollen and paper mills. Collieries produce several million tons of coal annually and in more recent years iron and steel and engineering works have progressed, all of which need power, which has stimu-

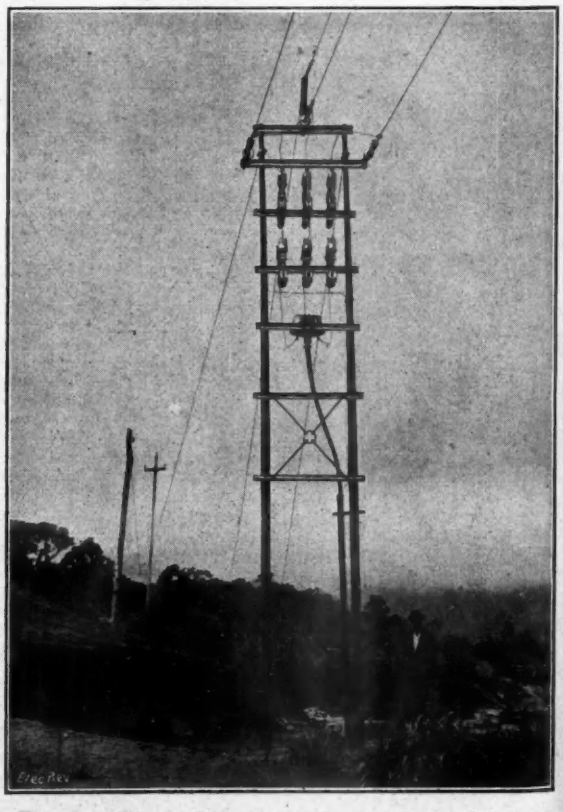


Fig. 2.—Terminal Mast with Isolators and Fuses.

lated the thermal and hydraulic production of electricity; but recently it may well be claimed that, so far as the larger centres of population are concerned, the electrical branch of engineering has played a more intimate part in their lives than any other.*

Progress of late years has been quite considerable, and general supplies of electricity are now available in all Indian cities of any importance, though the demand for energy is far below the corresponding figures in Europe and America, being about 200 kWh per head of the population per annum in the best cases.

Madras, the third city of India, known as the "City of Distances," has a municipal area of 27 square miles and some

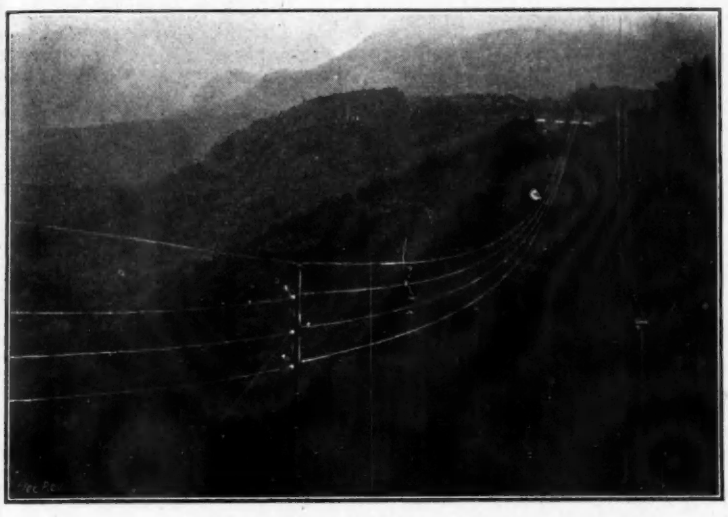


Fig. 3.—A Long-span Mast (950 ft.), with Strain Insulators.

300 miles of thoroughfares. It is supplied with direct current in the central portions and with alternating current on the outskirts, and the accompanying reproduced photographs, which are reminiscent of North Wales, illustrate an example of overhead transmission lines constructed in that district by Messrs. Siemens Brothers & Co., Ltd., of Woolwich.

They show parts of a 3-phase line operated at 3,300 volts and carried on steel lattice masts spaced normally 600 ft. apart, the maximum span being 950 ft. (fig. 3). The line consists of three steel-cored aluminium conductors, and a galvanised-steel earth wire. Fig. 4 shows a terminal mast on each side of a road with a cable crossing over the latter. The large tower is not part of the line, being part of a ropeway installation which serves as a means of transport to and from the Anamalai Hill tea plantations (see ELEC. REV., February 8th, 1929). Fig. 2, on the previous page, illustrates a terminal "H" mast composed of two Siemens tubular poles with isolating links and fuses mounted on it.

Estimates have recently been compiled for the projected development of some 40,000 h.p. hydro-electrically in the Madras Presidency, the energy to be transmitted a distance of 350 miles at a pressure of 150,000 volts, but the cost of tapping high-voltage lines is a serious financial handicap to long-distance distribution. In the case of lines operating at 100,000 volts or more the cost in the present state of the art is more or less fixed, irrespective of the demand to be fed, and if all proper safeguards are taken is probably in the neighbourhood of Rs.2 to Rs.3 lakhs per tapping, a very heavy initial outlay in respect of supply to a small town or village. Furthermore, reliability and stability factors enter prominently into the question of long-distance transmission and distribution, while the difficulty of effecting adequate inspection patrol is emphasised under Indian conditions.

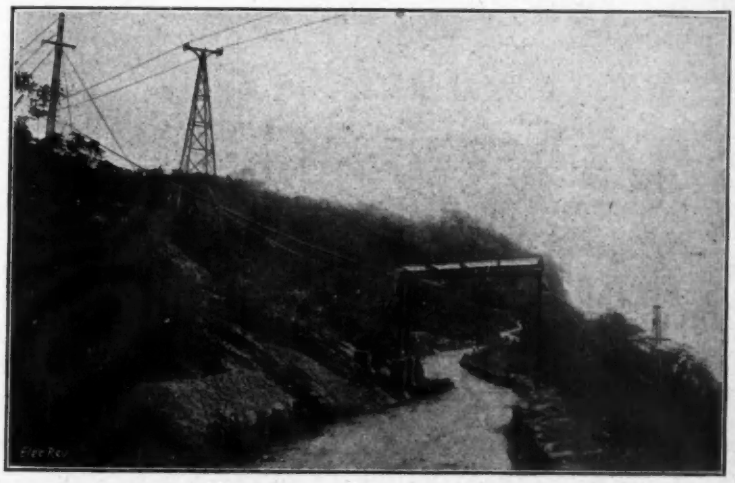


Fig. 4.—Electric Power and Ropeway Road Crossing.

Television in Germany.

The announcement on page 1050 of our issue of June 28th, 1929, under the above heading seems to Mr. A. A. Campbell Swinton to be "very mysterious," having regard to a letter which he published in *Nature* on June 8th, 1929, in which he pointed out that "the principle of Baird's transmitter was actually patented by Nipkow, a German, as long ago as 1884; that is to say, some four or five years before Mr. Baird appears, from *Who's Who*, to have been born."

* ELEC. REV., April 26th, 1929, p. 762.

Reviews.

Electric Wiring. By W. S. IBBETSON, B.Sc. Third edition. Pp. viii+424; figs. 208. London: E. & F. N. Spon, Ltd., 1929. Price 7s. 6d. net.

The third edition of Mr. Ibbetson's book on electric wiring has been revised and extended to bring it into line with the present-day requirements of wiremen and students. In its present form the work successfully meets the author's aim to provide a text-book on the theory and practice of electric wiring. It is clearly and simply written, and the portions dealing with electrical theory will be found easy of comprehension by those who dislike even elementary mathematics. A notable blemish of the book is the unsatisfactory character of the diagrams of connections. The conventional symbols recommended by the B.E.S.A. have been found by those of mature experience to be best fitted for diagrams of connections, and they have found such wide acceptance that failure to use them sacrifices clarity, and introduces unnecessary difficulty in following the connections represented. Mr. Ibbetson's book would, we consider, have been much improved if the standard conventions had been followed in the numerous diagrams contained in the work. We must also confess to a dislike of the symbols + ve, and − ve; since the meaning of + is "positive," the suffix "ve" seems redundant. In any case, why not use the words "positive" and "negative"?

The theoretical portions of the book are very satisfactory, and the principles are illustrated by a plentitude of fully-worked numerical examples. Ohm's law is dealt with after the rules for series and parallel resistances. The reverse order would appear to be logical. We are pleased to note that in his elementary explanation of a.c. principles the author avoids reference to cos ϕ, and sensibly defines power factor as the ratio of watts to volt-amperes. The section dealing with systems of distribution is good and clear, as is also the bulk of the chapter on electrical instruments. It is, however, regrettable that in his explanation of the induction watt-hour meter, the author should have found it necessary to refer to a rotating field and to the sine of a phase angle.

The portion of the book dealing with the practical side of wiring work merits high praise. Here we find excellent chapters on fuses and switches, systems of wiring, insulators and cables, and cable jointing, the treatment of the wood casing system being particularly clear and illuminating. The chapter on testing for faults in installations is good and practical, although brief. Good descriptive chapters are included dealing with filament lamps, arc lamps, batteries and bells and dynamos. The chapter on electric motors is very satisfactory, and contains full practical directions for this important phase of the work of the electrician. A useful feature is the full directions for reversing various types of motors; these directions are not only of practical value, but will also well repay careful study on account of the light they throw on the elementary theory of electric motors. The section dealing with a.c. motors is somewhat loose in parts. It is hardly correct to say generally of a synchronous motor that if it falls out of step it will stop, whilst the statement on p. 358 that polyphase motors take a starting current of from four to eight times the full-load current is also misleading.

There are numerous questions for solution, taken mainly from examination papers. The answers to those involving calculation might well have been given. An ample index concludes a well-written and thoroughly serviceable book.

Maste und Türme in Stahl. By Dip.-Ing. P. Sturzenegger, Zurich. Pp. 219; figs. 362. Berlin: Wilhelm Ernst and Sohn. Price 23 marks.

This book forms one of a series of monographs on the various applications of steel to engineering construction issued by Messrs. Ernst, and deals with the whole subject of steel masts and towers in considerable detail. A great increase in the use of such structures has occurred in all countries during the last 10 years—chiefly in connection with electrical distribution lines, electric railways and wireless work.

Besides the steel structure itself, the arrangement and suspension of the electric lines, in so far as these affect the choice of supporting masts, have also been considered.

Chapter 1 deals with the underlying principles of line construction, with some comparison of steel, reinforced concrete and wooden masts. Chapter 2 deals with the arrangement and necessary mechanical calculations for power and signal lines. Chapter 3 deals with the overhead line construction of electric railways. In Chapter 4 the questions of foundations and anchoring are considered, and Chapter 5 covers the question of the prevention of corrosion. Chapter 6 deals with erection methods and tools, and the costing of the work.

The book is very fully and clearly illustrated, both with dimensional diagrams and with photographs, and should prove of considerable service to the overhead-line engineer.

The A.T.M. Telegraph Engineers' Handbook. Pp. 116; illustrated. London: Automatic Telephone Manufacturing Co., Ltd. Price 2s. 6d. net.

This is a small handy book of reference for the telegraph engineer, who has always problems to solve, but not always easy access to their solution. It includes many important subjects which crop up in every-day practice, and there is plenty of room for extension in future editions. Some of the problems dealt with require a fairly advanced mathematical knowledge for their solution, but this is not lacking in the modern telegraph engineer. A good deal of the book naturally deals with A.T.M. apparatus and practice.

The following subjects are considered: Telegraph Transmission on Overhead Circuits, The Leaky Telegraph Line, Transients, The A.T.M. Gulstad Relay, Relay Testing Sets, The A.T.M. Universal Duplex Unit, The Vyle Polarised Sounder, Table of Exponential and Hyperbolic Functions, and A.T.M. Telegraph Apparatus (a list of the company's more important telegraph apparatus).

The book summarises a great deal of information in a small space, and should prove useful to telegraph engineers in general, but particularly to those who are dealing with, or about to deal with, the company's equipment.

Electric Lines and Nets. By A. E. KENNELLY, A.M., Sc.D. Pp. viii+426; figs. 222; tables. London: McGraw-Hill Publishing Co., Ltd. 1928. Price 25s. net.

This book abounds with the theory underlying artificial and real lines.

It forms a revision of the author's earlier book on the same subject, issued in 1917, giving new material dealing with real lines. Part of the old material has undergone abridgement and several changes. This new edition is comprehensive and, as can be expected when coming from the pen of Dr. Kennelly, explains the theory of the fundamentals and principles and properties of artificial, real, and composite lines, analysed in beautiful style for the various complexed conditions, both imaginary and real.

The application of complex vectors and hyperbolic functions and circular functions are explained; the distribution of current and voltage in closed networks; propagation behaviour; a.c. and d.c. currents in the steady state; current-carrying properties of lines; natural, image, and iterative impedances of a net; infra and super surge-impedance loads; lossless lines under reactive load; maximum power input of networks; properties of intermediate points of lines; growth factor of successive waves, &c. These and other matters relating to the theory of lines are discussed.

The book contains nineteen chapters and seven appendixes, involving the elementary trigonometrical relations applying to real and artificial lines; trigonometrical properties of real continuous-current lines; the steady-state differential equation of a uniform real line; impedance, admittance, and power of a smooth line at any point; equivalent circuits of a smooth line; lumpy artificial lines; the design, construction, and tests of direct-current artificial lines; complex quantities and alternating-current quantities; fundamental properties of alternating-current real lines; outline theory of the initial transient state in simple alternating-current lines; quarter-wave and half-wave real lines in the steady state; regularly loaded lines and attenuation measure; descriptive outline of alternating-current artificial lines, their history and uses; fundamental properties of alternating-current artificial lines; tests of alternating-current artificial lines; composite lines; electric networks in the steady state; the use of an artificial line as a filter for alternating-current frequencies; list of important trigonometrical formulas with circular and hyperbolic equivalents; an alternative method of dealing with continuous-current lines in terms of position angles in cases of super-surge-resistance loads; derivation of the elements of equivalent T and Π structures; development of vector transmission and reflection coefficients of voltage and current; derivation of the architrave impedance of a composite line; problems for solution; constants of telephone lines, &c.

To the advanced student interested or engaged in electrical engineering problems this book is well recommended. The paper, print, size and binding are of the regular McGraw-Hill Company's standard.

Arranging Window Displays.

How to Exhibit Fans and Fittings.

By W. A. GIBSON MARTIN.

TO judge from the windows of some electrical dealers, window dressing is regarded as a most unpleasant task, to be left to the junior members of the staff on every possible occasion. This is an entirely wrong attitude. If you can dress a better window, the public will find its way to your door, although your shop is in a back street off a side road, far from the main shopping centre. Window dressing has become an art. While the electrician cannot hope to compete with the Oxford Street and Regent Street type of window, it is quite easy for him to make a display of electrical goods which will compare just as favourably with other electrical dealers' windows as the Oxford Street displays compare with an ordinary draper's window.

Manufacturers are always willing to support the electrical dealer in arranging displays, and as their assistance costs nothing, or almost nothing, this aid is well worth having. There is not one dealer in a thousand who co-operates properly with manufacturers in display work. As an example, it will be supposed that a display of electric fans is being organised for the first of August, just when business men are beginning to feel the summer heat in their offices, and women find housework tiresome in the home. Preparations should commence at the beginning of July. The stock of fans should be brought up to normal, or slightly over. Letters should be sent to several manufacturers of electric fans, stating that a unique display is being arranged, asking what support they are prepared to give, and giving the dimensions of the window space. In some cases, a few show cards will be offered; in others, a complete "window trim" will be sent by return with a diagram showing how it should be assembled and a photograph to show the final appearance. On receipt of replies a portion of the store or packing room should be set aside, and a replica of the window arranged by marking off in white paint the dimensions of the space available for display. If possible, it is an advantage to use a platform to correspond with the level of the window floor as compared with the level of the street outside. Sides, back and ceiling can be filled in quite cheaply with beaver boarding. It is possible to have an excellent experimental window of this type for a few shillings, and the outlay will be repaid handsomely by the very first display for which it is used.

If it is decided to use a manufacturer's "window trim" (an American expression which refers to a background, pelmet, cardboard or plywood figures and other display features which can be packed flat for transport and storage, but when set up according to plan make a complete display), the back and sides can be erected in the experimental window, and the corners shaped as may be necessary. Cardboard of a suitable weight and colour may be obtained from a stationery store and used to fill up any gaps round pillars, or between the back or sides and the ceiling. Having erected the window trim satisfactorily, some attention must be given to the final appearance. There must be an individual or personal note. It is not sufficient to make people buy "Eureka" fans—"Eureka" fans may be bought at a hundred stores. They must be bought at Smith's electrical stores. Whilst taking advantage of the "Eureka" advertising which has made the name a household word in every good-class home in the country, the special ser-

vice rendered by Smith's must be emphasised. With his local knowledge, the electrician has a very clear idea of the individual needs of prospective customers, and this is his special selling point. For instance, he may calculate the consumption of the fan, and base his appeal on a figure of ½d. per hour, or whatever the local price of electricity may determine. A firm of ticket writers should be called in, and a few showcards ordered with the wording, "A cool office for ½d. per hour," or "For a farthing an hour, you can have a cool house all the summer," or "A cooling stream of air for ½d. per hour," or "During these hot afternoons—this fan costs only ½d. per hour." These showcards should be ordered in lettering and colour to match the remainder of the display, and should have the dealer's name and address prominently shown. If the ticket writer is asked to call, he will be able to copy the general style of the display, and reproduce the lettering and colouring to better advantage, so that the additional showcards will harmonise with the whole display.

By July 10th the display itself will be practically complete. Space should be booked in the local papers for an announcement about "Eureka" fans, and if blocks and copy can be obtained from the manufacturers, the advertisement will be more powerful than if the electrician has to rely on the limited founts of the newspaper office. Leaflets, over-printed with the dealer's name and address should be obtained from the manufacturers, and a letter drafted to be sent with this leaflet to a selected mailing list of business men at their offices, and to people in the better class residential districts. The letter to business men might offer the installation of fans free of charge in their offices for demonstration purposes.

By the last day of July, everything is complete, right down to the last detail. On August 1st the display can be erected in the window. As it has all been planned beforehand and the exact position is known to a fraction of an inch of items large and small, the actual dressing can be done in an hour or so. The polishing of the glass on the inside is important: this is often overlooked, and a dirty glass detracts from any window.

Ready-made displays are the exception, and not the rule: the retailer is often thrown upon his own resources, and the result is that neither the general effect nor the turnover are so satisfactory as when a properly planned window trim is employed.

For special occasions, such as the autumn display or the Christmas season, there are expert display firms who will design and supply a novel treatment at quite a reasonable figure, but in the ordinary way, a few guiding principles put into operation with originality and intelligence will result in a series of interesting displays with a beneficial effect upon the turnover.

The experimental window already mentioned is a most valuable adjunct in planning displays, for it is the only method by which ideas can be tried out, amended and improved, and finally passed as suitable for the actual window. It provides a sound way of training the staff in the art of display, leads to the discovery of hidden talent in this direction, and raises the standard of salesmanship throughout the whole establishment.

A successful display must arrest attention, arouse interest, and create the desire of possession, and the degree of success may be judged by the amount of work which is left to the salesman. Some displays may be so efficient as to compel purchase, in which case the salesman has only to take the order and arrange about delivery. While this may be the ideal in some ways, it is not always so in the electrical trade. A person may resolve to purchase an apparatus which is quite unsuitable for his installation, and the discovery of this fact will create such a feeling of disappointment that no effort of the salesman will lead to the sale of some more satisfactory product. If the display had stopped short at the "desire to possess" phase, the salesman could have guided the thoughts of the customer towards an article suitable for the local conditions, and the sale would have been completed in a satisfactory manner.

A haphazard assortment of electrical goods will not attract attention, for the great majority of all retail windows are of this type. The central idea upon which a display should be based is first of all to arrest attention. The eye level is the vital point in arresting attention, and the whole display should be focused on this one centre. Having fixed the attention at eye level, the eye should be directed naturally and easily to the remaining sections of the display, these sections being designed to arouse interest. As people hurry along the main street on their way to keep an appointment, to catch a train, or to reach office or workshop, one passing glance may be given to a window. In that brief period the display has to catch the eye and compel the pedestrian to stop. If the window gives a blurred impression, if it looks just exactly the same as usual, or if it does not have the focusing point on the eye level, then it will fail to catch the eye, and not one person in a hundred will stop. The human eye is incapable of absorbing half-a-dozen things at a glance. It can take in one thing and one only at a time, and therefore the subject for the eye level must be simple and capable of being easily understood at a glance, and a good background is highly desirable. In the back and on the floor of many windows there is a miscellaneous collection of articles, all of which distract the eye. Whatever attention has been arrested is distributed over a wide range of goods, and in the end the display achieves nothing. At the very worst, a window with a properly arranged focusing point will leave a crisp and clear image in the mind of the passer-by which may result in a sale at a later date. At the very best, the miscellaneous type of window leaves a hazy impression, easily obliterated by the very next window which may be seen, and possibly entirely forgotten within a day or two. The back and floor, and in some cases the ceiling as well, should contrast with the display, throw up all the detail of the articles in strong contrast, and make the eye level "stand out" distinctly. Coloured cardboard, beaverboard painted a suitable colour, or plywood may be used for this purpose, while important displays can have unfadable casement draped in folds round the back, and stretched on the floor. As a general rule, a light coloured background should be chosen for dark coloured articles, and *vice-versâ*. The cold colours—green, blue, and violet—make suitable backgrounds for articles mainly of the warm colours, while the warm colours—red, orange, yellow and brown—make good backgrounds for articles in the cold colours.

Bearing these principles in mind, let it be supposed that a window is about to be planned for a display of electrical fittings for the home. Considered from the angle of the householder as distinct from that of the electrician, the two main divisions in the design of electrical fittings are (*a*) fittings to suit the classical periods, and (*b*) fittings to suit the popular ultra-modern furnishing schemes. The two do not harmonise for display purposes, and so it would be better to devote one window to period and the other to modern fittings. The period window would be mainly in metal colours, and so the background might be a dead black, with black felt on the floor. The covering for the back of the window could be slit where necessary to admit the wiring for and fixing of the fittings to be displayed. Suspended from the ceiling, and hanging at the eye level, there may be a large oblong showcard covered with gilt coloured wallpaper and bearing the words in bold face but neat lettering: "Is *your* room furnished in one of these styles?" About half-a-dozen fittings only should be shown: a polished brass pendant for the William and Mary period, and one on rather simpler lines for Cromwellian furniture. A dignified wall bracket rather heavy in appearance, for Queen Anne, a good type of pendant for Adam furniture, a satin finish and rather elaborate pendant for Sheraton, and a light, graceful wall bracket for Hepplewhite—these are only suggestions which can be modified or elaborated according to the tastes of the local people and their ideas about period furniture. Above each fitting there should be suspended a gilt showcard with descriptive lettering in black, pointing out the features of the design which are peculiarly suitable for the period named. The electrician is rather apt to take refuge behind terms like Tudor, Georgian and French: it will be something out of the ordinary to show that the various furniture periods are understood, and that the dealer can supply fittings in keeping with the character of each period.

The ultra-modern window can be treated in much the same way, but with a really striking background to throw up the delicate tints of etched glassware, and the sudden angles and square lines of modern fittings. The display may be divided into two sections, one showing fittings for the purely angular type of furniture and the other dealing with the restrained use of the curve. The lettering for the showcards should be very up-to-date; for instance, the words can begin without any capitals as has been done in some modern advertisements, or they may be lettered in a purely modern style with plenty of character.

A South Coast Development Proposal.

An interesting suggestion for the future electrical development of the South Coast is made in a report just published by the Arundel, Littlehampton, East Preston and District Joint Town Planning Advisory Committee. Mr. Arthur H. Schofield, the town-planning consultant, suggests that the bed of the old Arundel and Chichester canal might be utilised for a special road designed and used exclusively for swift motor traffic. He also proposes that the main distributing line of the "grid" electricity system be placed alongside the road, and further that the track of the Selsey tramway could also be made use of in a similar way. It is stated that the scheme of the Electricity Commissioners for South-East England terminates in an apparently unsatisfactory manner at a boundary drawn through the centre of the region described in the report. "Ultimately a line operating at 132,000 volts will be carried from Brighton to Portsmouth. The appearance of the transmission towers, which will be 70 or 80 feet high at intervals of about 900 feet, has been much criticised. Within the region probably no work will be proceeded with for two or three years, and the lines will then run parallel with the coast, so that no invasion of the seclusion of the Downs is likely. Any attempt to disguise the outward appearance of the equipment should be avoided. On the Continent, where electrical development is more advanced, the pylons rarely clash with their surroundings, and in the Irish Free State the lines radiating from the Shannon, though designed from a rigidly engineering point of view, do not unduly mar the beauty of the countryside. There are places which, by their exquisite beauty, demand that engineering features shall be either excluded or located beneath the surface."

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Rotary Pump.

The "Hodac" rotary pump which we illustrate, figs. 1 and 2, has been designed by Mr. Cecil Hodges of the HODGES SWITCHGEAR CO., LTD., Wool Exchange, London, E.C.2, and embodies some new and interesting features. The impeller, fig. 1, consists of a motor with 6 U-shaped sections, each containing a roller which flies outwards by centrifugal force when the impeller is rotated, thus sealing each section of the rotor. As the rollers rotate on their own axes the loss due to friction is very greatly reduced and the wear and tear is correspondingly small.

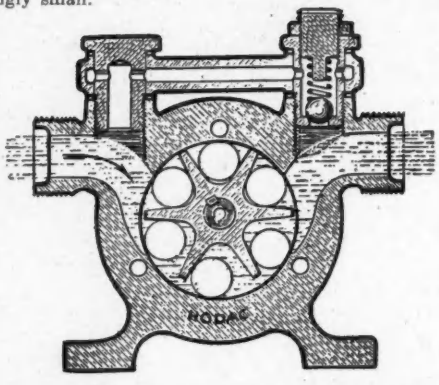


Fig. 1.—Section of Pump, showing Impeller and Release Valve.

The design of these rollers enables the pump to be run at a low speed. Tests of the pump show, it is claimed, that a suction of 30 ft. and a head of 100 ft. can be obtained. Another interesting point is that the rollers are of different materials for working with different liquids. A special fibre is used when pumping water and light liquids, and for heavy oils, tar, &c., the rollers are of steel.

Fig. 1 also shows the release valve which prevents the pressure in the delivery side getting too high for the pipes, the ball valve working against an adjustable spring opens on an excess of pressure and closes again automatically when the pressure is reduced.

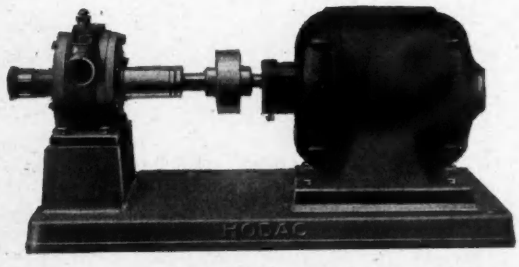


Fig. 2.—A "Hodac" Motor-driven Pump.

A Line-sag Adjustment Instrument.

We have received from Mr. O. G. KARLOWA, Abford House, Victoria, S.W.16, some particulars of the Küppers altimeter which has been introduced by Messrs. Ackania-Werke for the adjustment of overhead lines to definite amounts of sag. The distinguishing feature of the apparatus is a parallelogram device coupled with a telescope that is free to swing in any direction. The instrument is erected at a conveniently accessible point, either in or outside the field of span, at a height preferably not less than about the height of the line supports. The plane of the parallelogram must be perpendicular to the plane of the span, and the fulfilment of this condition is ensured by the familiar method of bringing down right angles. The sighting needle fitted to the instrument to facilitate rapid direction-finding will then be parallel with the wire. The measuring apparatus is set truly perpendicular by means of a circular spirit level, and the telescope is then used to sight first one of the suspension points, after which it is swung over to the second point; using the fine adjustment screws, the two points are made to coincide on the cross-web. The telescope will then describe a straight line between the two suspension points. There is a graduated scale which at once shows the angle of inclination between the line connecting the two suspension points and the horizontal. By tilting the telescope the connecting line is brought down exactly parallel; the operator having next ascertained, by swinging to and fro, that the plane of the line of sight is identical with a plane tangent to the overhead line, only a small further calculation is needed. The usual procedure is to set the measuring parallelogram so that the distance scale, which is graduated in millimetres, is pointed horizontally to a reference line, whilst the altitude scale, likewise divided in millimetres, is perpendicular to the former, this being achieved by pushing it up to a stop firmly attached to the instrument. After setting the altitude scale to a proportional distance figure on the horizontal distance scale, the first reading can be taken as soon as the two suspension points appear in the cross-web. The second reading is provided by the tangential point. The difference between these two readings is then corrected by reference to a correction table provided, the adjustment varying according to the angle by which the line connecting the suspension points is inclined out of the horizontal.

Armature Air-gap Gauges.

MARTINDALE ELECTRIC CO., LTD., The Hyde, Hendon, N.W.9, recently introduced a range of gauges for the measurement of armature air gaps. They are of the feeler type and are made in six sizes, three with seven or eight blades each, 16 in. long, varying in thickness from 5 to 60 thousandths of an inch, and three smaller ones with eight blades each, 8 in. long.

An Electrical Machine Regulator.

The accompanying illustration, fig. 3, shows the "Duplex" vernier type regulator made by the WALSALL ELECTRICAL CO., LTD., 61, Bridge Street, Walsall. This type of regulator has many advantages, it is claimed, over the ordinary type, and occupies no more space on the switchboard, either at the front or back. The standard regulator is fitted with 30 contacts for "coarse" adjustments, and 10 contacts on the vernier portion for accurate regulation. The radial switch arm is controlled by concentric hand wheels. The switch is of the laminated-brush type, with liberal contact area, and together with the contact studs is mounted on an ebony "Sindanyo" panel. The resistance units are of a special non-ferrous alloy, having a negligible temperature coefficient, and will not rust, it is claimed, get brittle or perish with heat, age or exposure. The units are mounted on an insulating and heat-resisting compound, and are rated on a conservative basis. The standard design is suitable for currents up to 50 A. Having concentric hand wheels, the manipulation is very convenient when "paralleling" or controlling the alternator field.

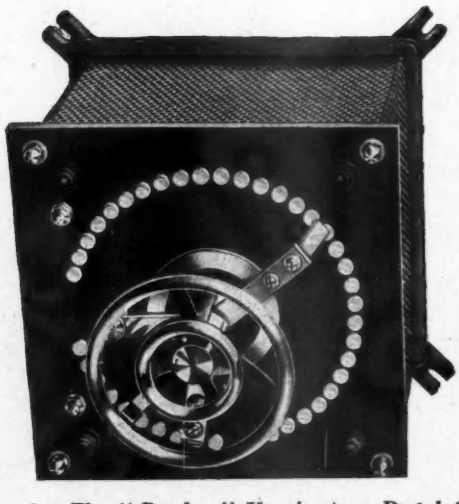


Fig. 3.—The "Duplex" Vernier-type Regulator.

An Automobile Fan.

The "Goltone" fan, fig. 4, has recently been introduced by Messrs. WARD & GOLDSTONE, LTD., Frederick Road, Pendleton, Manchester, principally for use in enclosed motor-cars, but it is also claimed to be suitable for home and office use. It is designed to operate from the car-starting and lighting unit, the current consumption being about that of the rear lamp bulb. It is made in two types for 12 V and 6 V, respectively.

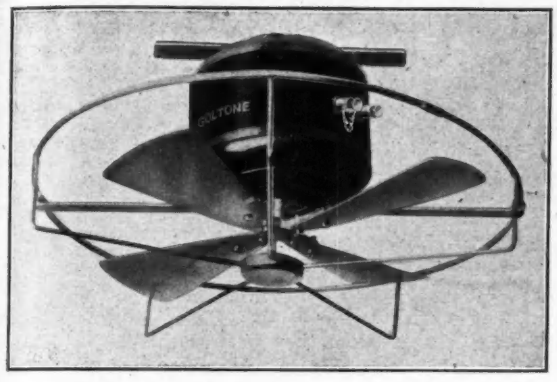


Fig. 4.—The "Goltone" Electric Fan.

The spread of the blade is 7½ in., the depth of the fan 4½ in., and its weight 1½ lb. The body of the fan is of moulded bakelite or similar material, and the whole presents a very neat appearance.

Legal.

AT Morecambe Police Court, last week, H. B. Atkinson was summoned on four charges of selling electric lamps bearing a false trade description. The prosecution was conducted by Mr. L. A. Byrne, on behalf of the General Electric Co., Ltd. The prosecution was under the Merchandise Marks Act, and it was stated that the lamps in question were marked "Osram, gasfilled. Made in Italy." They were, as a matter of fact, made in Germany and sent *via* Italy. Mr. C. H. Jones, representing the General Electric Co. in the Blackpool district, bought two of the lamps from the defendant, who said they were not English, but foreign. The lamps were very inferior to genuine "Osram" lamps. Evidence of the manufacture of the lamps in Germany was given by Dr. Heinz Wirthweim, general engineer to the Kommanditgesellschaft, Germany, which concern had a special arrangement for making "Osram" lamps in Germany. No "Osram" lamps were made in Italy, but this firm had the sole right to sell them in that country. The witness examined one of the lamps sold by Atkinson, and denied that it had been made by his company. Mr. A. E. Adams, factory superintendent to the G.E.C., said that the two lamps concerned were not made by his company, though he agreed that the cartons in which they were packed were made at Bristol. For the defence, Col. Wilson said that the lamps were bought in March from a traveller. The defendant looked at the carton and found it labelled "Osram," while the lamp was marked "gasfilled," and there was a picture of the factory on the box. Defendant bought the lamps as "Osram" lamps and sold them as such. He had no reason to suppose they were anything else, and Col. Wilson contended that he had taken all reasonable precautions, as required by the Act. The defendant paid 18s. for the dozen lamps which he bought, and as they were to sell at 2s. 3d. each he saw nothing out of the way in the price. The Bench decided that the defendant had acted innocently and dismissed the charges. Col. Wilson said that he would give the prosecution the name of the traveller.

Glasgow Electricity Department's Accounts.

SHERIFF-PRINCIPAL A. O. M. MACKENZIE, on June 22nd, upheld the judgment of Sheriff Macdonald at Glasgow Sheriff Court in an action at the instance of a ratepayer against Glasgow Corporation. Plaintiff asked that certain electricity accounts for the year ended May, 1928, should be produced by the Corporation, and that the Court should order the Corporation to lodge in Court full details of certain items contained in the accounts of the department along with relative vouchers. In a note, his Lordship says that it was the obvious intention of the Legislature to enable an elector to obtain information which would make it possible for him to state relevant objections to the accounts.

Theft of Electricity.

LESLIE ROSS, a miner, of Hammerwich, was summoned at the Lichfield County Sessions on June 26th for fraudulently abstracting 27 kWh of electricity belonging to the Chasetown and District Electricity Supply Co. It was stated that defendant removed a wheel from the meter which enabled him to obtain electricity without placing any money in the slot.

Defendant said that the meter had been out of order ever since he had lived in the house, and he had only put 1s. 6d. into it, which was denied by the company's collector.

Ross was fined £2 14s., or in default of payment within 14 days, one month's imprisonment.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Whitleyism.

I think everyone who is connected with the electricity supply industry will readily admit that Alderman W. Walker has rendered valuable national service in so ably steering the Whitley Council of the electricity supply industry through its first 10 years of existence. As chairman of both the Joint Council and Joint Board, he has earned the confidence of both sides of the Whitley Council, and has guided it through most difficult times, and by his tact and skilful handling has won for this voluntary organisation the practically unanimous recognition of every party represented in the industry. His devotion to the interests of the electricity supply industry has again been displayed in the valuable paper which he contributed on Whitleyism at the recent I.M.E.A. Convention. In that paper Alderman Walker took the industry into his confidence, sketched out the difficulties that lay immediately ahead, and outlined the problems that would have to be solved in the future, expecting, no doubt, that in the discussion on his paper suggestions would be made which would be of help to those who are serving on the Council.

The discussion at the Convention was very limited owing to lack of time, and the object of this letter is to raise again the issues mentioned in the paper in the hope that in the correspondence columns of the ELECTRICAL REVIEW they may receive the consideration that the subject deserves.

When first founded the Whitley Council dealt almost entirely with wages and conditions of employment, and the whole of the time was needed to deal with this aspect of its work; in that respect it has fallen short of the intentions of the signatories of the Whitley reports, and it has not even covered the ground outlined in its own constitution.

With wages and conditions of employment as its sole preoccupation for so many years, it is not surprising that both sides of the Council have forgotten that the real object of their existence was to inquire into the special problems of the industry with a view to improving its efficiency.

One factor that has worked against the realisation of this larger outlook was the fact that most of the Unions represented on the Council had only a small proportion of their members in the supply industry, and there was therefore a natural tendency to look on the industry as a lever for exerting bargaining power, and this tendency becomes more manifest as real grievances are removed, wages are stabilised, and there is nothing left for the Council to do.

Another disturbing factor is that the workers' representatives realise that big adjustments are pending, due to the reorganisation of the industry under the operation of the Central Electrjcity Board; they do not know how they will be affected, but, profiting by past experience, they are manœuvring for position.

It seems to me that now is the time to relegate wages and conditions of employment, which are more or less stabilised, to two national sub-committees whose main duty will be to deal with anomalies and interpretation. One sub-committee will take the place of the Joint Council dealing with wages and conditions relating to workmen, and the other sub-committee will take the place of the Joint Board dealing with wages and conditions relating to staffs, and perhaps also chief engineers.

Next, bring into being a three-party Council consisting of equal representatives of employers, staffs (employés' side of the Joint Board) and workmen (employés' side of the Joint Council), this three-party Council to deal *in an advisory capacity only*, with all the problems of the industry other than wages and conditions of employment. This Council of employers, management, and workmen, which will really represent the industry, should survey all the developments due to the operation of the Central Electricity Board, and should relegate to sub-committees of the Whitley Council the special problems that arise.

Examined from three different angles, valuable suggestions are bound to emerge, mutual confidence will be created by a free exchange of opinions, and from the workers' side will

be removed the suspicion that things are developing behind the scenes to their detriment.

Alderman Walker, in his paper, drew attention to the surprising ignorance displayed by some of the men's representatives of the fundamental facts relating to the administrative and financial side of supply undertakings. These wrong conceptions would automatically be put right at these three-party conferences, and the educative effect of these conferences would be a great gain to the industry.

As and when wages questions arise, the three-party Council will divide again into two groups, or two sub-committees, for the occasion, employers and staffs-Joint Board—employers and workmen-Joint Council.

It is obvious from the data and arguments put forward by Alderman Walker that wages settlements should be on a national basis and not on a district basis, therefore District Councils will deal solely with the general problems of the industry, and should therefore coincide in area with the electrical areas set up under the Central Electricity Board. These Councils would also be of the three-party grouping, breaking up into two sub-committees when anomalies have to be dealt with with regard to wages and conditions of employment.

I have already taken up so much space that I will only deal briefly with two of the other problems raised by Alderman Walker.

The need for a permanent secretary for the employers' side is obvious when we remember that the other two parties, staffs and workers, have such officials and cannot carry on without them.

Another point raised by Alderman Walker was the desirability of giving legal sanction to the decisions of the Joint Council. It is not fair that the small minority should stand out against these decisions when they are being honoured by the majority, and as the only way to ensure that everybody adheres to those decisions is by legal enforcement the Councils should have the necessary authority to obtain an order from the Ministry of Labour which will give legal authority to their findings. The necessity of everyone conforming to national decisions has become more urgent in view of the reorganisation of the industry on a national basis. The linking-up schemes of the Central Electricity Board are making electricity authorities dependent upon one another, and instead of these authorities being a law unto themselves as regards methods of generation, they have to conform to regulations which are laid down for the benefit of the industry as a whole. If such regulations are enforced with regard to generation there is no reason why other regulations should not be enforced in connection with national rates of pay. The need of co-operation and harmonious working between stations also makes it desirable that there should not be variations in the rates of pay which are applied.

I will conclude by reminding you that years ago the E.P.E.A. advocated the three-party Council *for all matters other than wages*, and that I opened a discussion at an informal meeting of the I.E.E. in London on this subject. The proposal did not find favour with the employers' representatives of that day because they were afraid that it meant a contest of two parties against one, but that is an impossibility if the safeguards that we advocated then were adopted, namely, that the three-part Council may not deal with wages, and in the general problems of the industry it could only act in an advisory capacity, for obviously he who pays the piper will always call the tune, but may be very glad nevertheless to hear the opinions of all the parties concerned.

In any case, periodical conferences of the three parties in industry on their common problems must result in great benefit to the industry.

John H. Parker.

West Hartlepool, *June 29th*, 1929.

National Co-operative Research.

The British Electrical and Allied Industries Research Association has for the past eight years carried out a series of far-reaching investigations with results of great value to the country in general, and in particular to all interested in the production, supply, and use of electricity. The importance of this work is our justification for asking your attention at the present time to the Association and its prospects.

The main objects of the Electrical Research Association may be briefly summarised thus:—

(*a*) To investigate matters affecting the proper utilisation of plant, apparatus, and materials, with a view to greater reliability in operation and the extension of the useful life of such plant, leading to a reduction in the cost of electricity.

(*b*) To investigate materials and methods used in the manufacture of electrical plant and apparatus, to develop improved and simplified methods of test for ensuring that materials reach a proper standard, and so secure the establishment of standards for performance, which can be relied on by the manufacturers and users of plant and apparatus.

Such investigations, it will be realised, benefit not only the makers of electrical machinery, but all who use it, and not least those who supply electricity to the public.

The Research Association was originally founded under the scheme of Research Associations developed by the Department of Scientific and Industrial Research, and has received from the Government financial support, without which its work would have been impossible. This support has, in accordance with the approved policy for Research Associations, been on a diminishing scale and, under the present scheme, terminates next year. Meanwhile, the demands on the Association by the industry are steadily increasing, and it is urgently necessary that it receive help on a more liberal scale than hitherto.

While the Association has in the past derived its main support from the manufacturers, they alone cannot be expected to accept the responsibility of replacing the assistance hitherto accorded by the Government; hence we appeal to manufacturers, authorised undertakers throughout the country, both local authority and company, and consumers of electricity, who directly benefit in reduced expenditure from the work of the Research Association, to take their part in this necessary effort to obtain further financial support.

Proposals for reorganisation to enable the work to be carried on and, if possible, extended, will reach you shortly. They have been drawn up by a representative conference, and it is in connection with them that we ask, in your own interests as well as in the interests of the industry generally, that you will give their appeal your careful and sympathetic consideration.

John Snell,
Chairman, Electricity Commissioners.

Andrew R. Duncan,
Chairman, Central Electricity Board.

K. Edgcumbe,
President, Institution of Electrical Engineers.

A. Nichols Moore,
President, Incorporated Municipal Electrical Association.

W. B. Woodhouse,
President, Incorporated Association of Electric Power Companies.

Harry Renwick,
Chairman, Provincial Electric Supply Association.

J. Bailey,
Chairman, Conference of Chief Officials of the London Electric Supply Companies.

S. Z. de Ferranti,
President, British Electrical Development Association.

F. Watlington,
Chairman, British Electrical and Allied Manufacturers' Association.

Maurice Solomon,
Chairman, Cable Makers' Association.

R. T. Glazebrook,
Chairman of Representative Conference.

London, W.C.2, *June*, 1929.

Overhead Lines.

"Protestant," on p. 1128, June 21st issue of the ELECTRICAL REVIEW, objects to sending in Form El.C.53B.

Would it not be practicable for someone to organise all the details that have been sent in by all who have secured consent to their designs? Then the engineer who wants to get ahead with distributing electricity would be in a position to say *to himself:* "Of all the approved constructions, the one that suits my pocket best is the one I can proceed with, knowing that it has been approved elsewhere, and must be approved when I send in my copy."

Of course, this involves each one supplying copies of his successful forms El.53B to the generous man we will name Confidential-Organiser-of-Accepted-Designs-for-Overhead-Construction-in-Great Britain-and-N.I.

This involves no economy in work in Savoy Court and no interference with routine. No one would quote any reference, so that the checking of each copy of the calculations sent in could proceed without discovering they were copied.

Clearly, the publication of the work of the organiser would be private and confidential, and communicated only to authorised undertakers.

R. C.

June 27th, 1929.

The Price of Brains.

Let me heartily endorse Mr. A. Milne's letter under the above heading, but also let me add to it.

The "successful" applicant will in all probability be presumed to direct, and be responsible for, the work of a foreman, or the like, receiving about £250 per annum.

This is called "experience."

C. C. M. Fullerton,
M.A., G.I.Mech.E.

Derby, *June 28th*, 1929.

The letter written by Mr. Alex. Milne on the subject of "The Price of Brains" shows that that gentleman does not take the long view. Mr. Milne should remember that the successful applicant for the post he mentions could, by diligence and hard work, gradually work himself up to the position of a dustman, when he would get a salary of £4 per week.

In case this statement should put ideas into the heads of the Town Council, I hasten to add that it is "writ sarcastic."

J. M. S.

July 1st, 1929.

Lady Demonstrators.

In the ELECTRICAL REVIEW of June 28th, in the "Situations Vacant" column, there appears an advertisement from the Cheltenham Borough Council for a lady demonstrator of electrical apparatus, at a salary of £208 per annum. I should like to know why a lady is asked for. Is there no male member of the electrical industry capable of performing the duties required? The Gloucestershire town has evidently forgotten the appeal of the late Earl Haig, and also that of Mr. S. Baldwin when he was Premier.

Unemployed Electrician.

July 1st, 1929.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1927.

32,401. "Instrument for indicating and/or recording electrical pressures, currents or resistances." J. Neale. December 1st, 1927. (313,014.)

32,554. "Electric heating, more particularly intended for use with mercury-vapour lamps." F. Reynolds and L. Sample. December 2nd, 1927. (312,945.)

1928.

384. Elevator safety systems." Waygood-Otis, Ltd. March 1st, 1927 286,243.)

2,937. "Electric discharge tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). January 30th, 1928. (313,184.)

3,165. "Loud-speakers and the like." O. D. Lucas. February 1st, 1928 (Cognate application 8,706/28.) (312,950.)

3,328. "Manufacture of fuse heads for electrical firing." D. T. Jones, F. J. Moore and Imperial Chemical Industries, Ltd. February 2nd, 1928. (Cognate application 8,759/28.) (312,952.)

6,459. "Reproduction of sound." C. F. Elwell and De Forest Phonofilms, Ltd. March 1st, 1928. (313,022.)

6,473. "Thermionic and like amplifying systems." W. S. Smith and N. W. McLachlan. March 1st, 1928. (313,063.)

6,474. "Electro-acoustic transmission and the like systems." W. S. Smith and N. W. McLachlan. March 1st, 1928. (312,962.)

6,475. "Signalling apparatus applicable for use on automobiles." J. L. Scott. March 1st, 1928. (312,963.)

6,480. "Induction-current generating apparatus for medical treatment." Y. Noishiki. March 1st, 1928. (313,193.)

6,623. "Apparatus for indicating electrically the position of adjustable units." Siemens & Halske Akt. Ges. May 20th, 1927. (Addition to 280,562.) (290,653.)

6,663. "Electric discharge tubes." J. Allen. March 3rd, 1928. (312,971.)

6,755. "Quartz lamps." Quartzlampen Ges. March 4th, 1927. (286,318.)

6,888. "Electrical power distribution systems." Igranic Electric Co., Ltd (Cutler-Hammer Manufacturing Co.). March 5th, 1928. (313,030.)

6,900. "Automatic prepayment-meter for electricity, gas, water, and the like." Allgemeine Elektricitäts Ges. March 5th, 1927. (286,628.)

6,925. "Adjustable brackets or supports for telephones." A. G. Westmoreland. March 6th, 1928. (Cognate application 20,676/28.) (313,069.)

6,926. "Adjustable brackets or supports for telephones." A. G. Westmoreland. March 6th, 1928. (313,107.)

7,132. "Circuit arrangements for use with high-frequency currents." E. Green. March 7th, 1928. (313,111.)

7,152. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. E. Beale. March 7th, 1928. (313,113.)

7,153. "Telephone systems." Associated Telephone & Telegraph Co. March 7th, 1927. (286,659.)

7,225. "Telephone systems." Siemens Bros. & Co., Ltd., W. G. Patterson and J. E. Tees. March 8th, 1928. (313,200.)

7,361. "Electrical indicating and/or recording apparatus." W. Philips and Elliott Bros. (London), Ltd. March 9th, 1928. (313,208.)

7,426. "Electric relays applicable more especially in electric motor control systems." R. Brooks and Associated Electrical Industries, Ltd. March 9th 1928. (313,211.)

7,475. "Insulation of high-tension cables and high-tension cable joints." Engineering Products Corporation, Inc. March 11th, 1927. (286,733.)

7,740. "Process and an apparatus for carrying out the oxidation or reduction of electrolytes." Siemens & Halske Akt. Ges. October 8th, 1927 (298,461.)

8,072. "Control systems for dynamo-electric machines." British Thomson-Houston Co., Ltd., F. H. Harris, L. R. Nixon and J. V. Peacock. March 16th, 1928. (313,223.)

8,211. "Electrically-operated sound transmitters." H. Baron (Electro-acustic Ges.). March 17th, 1928. (313,224.)

8,327. "Electric heaters." British Thomson-Houston Co., Ltd. March 19th, 1927. (287,467.)

8,379. "Electrical circuit-breakers." R. Brooks and Associated Electrical Industries, Ltd. March 19th, 1928. (313,227.)

8,494. "Amplification of electrical oscillations." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 20th, 1928. (313,229.)

8,507. "Thermostatically-controlled electric switches." General Electric Co., Ltd., and W. Wilson. March 20th, 1928. (313,230.)

9,442. "Signalling apparatus for use on motor-cars and other vehicles, and at cross-roads." R. H. Bromfield. March 29th, 1928. (313,240.)

10,078. "Circuit arrangement and apparatus for measuring high voltages." J. E. Pollak (Hermsdorf-Schomburg-Isolatoren Ges.). April 3rd, 1928. (313,247.)

10,217. "Electric lighting, heating, or power systems." Chloride Electrical Storage Co., Ltd., and E. R. Sanderson. April 4th, 1928. (313,248.)

10,839. "Method of control for wireless reception apparatus." C. Holt and Economic Electric, Ltd. April 12th, 1928. (313,256.)

12,711. "Brush-holders for dynamo-electric machines." G. A. Juhlin, R. Townend and Associated Electrical Industries, Ltd. April 30th, 1928. (313,267.)

12,881. "Controlling gear for electrically-propelled vehicles." English Electric Co., Ltd., and F. Morris. May 2nd, 1928. (313,268.)

12,921. "Automatic speed-control mechanisms and the like." Marconi's Wireless Telegraph Co., Ltd. May 2nd, 1927. (289,818.)

14,044. "Electric rectifiers." Siemens & Halske Akt. Ges. May 24th, 1927. (291,026.)

14,088. "Loud-speakers." Radio & Electric Services, Ltd., and B. Groom. May 14th, 1928. (313,282.)

14,754. "Commutators for dynamo-electric machines." R. Edmondson and Associated Electrical Industries, Ltd. May 19th, 1928. (313,289.)

15,116. "Metallic vapour lamps and gaseous discharge devices." P. Freedman. May 23rd, 1928. (313,292.)

15,550. "Ignition apparatus for internal-combustion engines." M-L. Magneto Syndicate, Ltd., and E. A. Watson. May 26th, 1928. (313,296.)

15,582. "Electric contacting devices for accomplishing a temporary connection, for making measurements to, or for short-circuiting or earthing conductors." H. A. H. Nijland. May 29th, 1928. (Addition to 215,214.) (313,297.)

17,000. "Electric contact pin or plug." Langendorf Watch Co. May 21st, 1928. (312,141.)

17,780. "Vacuum electric-tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. June 19th, 1928. (313,318.)

17,890. "Circuit arrangement for the transmission of messages over telephone lines." Siemens & Halske Akt. Ges. July 11th, 1927. (293,747.)

17,909. "Quick-acting regulator of the vibrating type for keeping the current or voltage of generators constant." Akt. Ges. Brown, Boveri & Cie June 20th, 1927. (292,521.)

18,130. "Telephone switching cabinets." Siemens & Halske Akt. Ges. August 12th, 1927. (295,374.)

18,222. "Impulse-senders for automatic telephone systems." Coventry Automatic Telephones, Ltd., and H. G. Menage. June 23rd, 1928. (313,323.)

19,086. "Electric irons." Walker, Hunter & Co., Ltd., and J. Walker July 2nd, 1928. (313,329.)

19,890. "Brush-holders for dynamo-electric machines." General Electric Co., Ltd., and W. M. Cranston. July 9th, 1928. (313,342.)

21,451. "Microphones." C. Lorenz Akt. Ges. January 21st, 1928 (304,584.)

21,748. "Electric switches." G. H. Ide and H. L. Bentley. July 27th, 1928. (313,356.)

24,793. "Signalling and control apparatus for road traffic." W. Murray. August 29th, 1928. (313,371.)

31,337. "Electric conductors." International General Electric Co., Inc October 29th, 1927. (299,716.)

31,673. "Light-control devices suitable for use in recording sounds or in picture telegraphy and for like purposes." Telefunken Ges. für Drahtlose Télégraphie. November 3rd, 1927. (299,884.)

32,018. "Switches for use with transformers." International General Electric Co., Inc. November 3rd, 1927. (299,893.)

32,046. "Electrical ignition system for internal-combustion engines." R. Bosch Akt. Ges. May 26th, 1928. (Divided application on 293,851.) (Addition to 293,851.) (313,395.)

33,915. "Talking-film apparatus." Dr. H. Konemann. November 25th, 1927. (301,082.)

1929.

7,232. "Magnetostrictive vibrators." G. W. Pierce. January 3rd, 1928. (Divided application on 283,116.) (313,031.)

13,296. "Loud-speakers and the like." O. D. Lucas. February 1st, 1928. Cognate application, 13,297/29.) (Divided application on 312,950.) (312,979.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 26th:—

Celebro. No. 499,818. Class 8. Wireless-telephonic instruments, &c.—Celebritone, Ltd., Commerce House, 72, Oxford Street, W.1.

Atomlite. No. 499,933. Class 8. Philosophical and scientific instruments and apparatus for teaching.—John Vielle, 35, Cator Road, Sydenham, S.E.26.

Silver-Chimes. No. 501,556. Class 8. Wireless-telephonic receiving apparatus.—Louis Kremner, 49a, Shudehill, Manchester

Stelled. No. 501,914. Class 8. Philosophical and scientific instruments and apparatus.—Beardmore Petrol Station, Ltd., also trading as the Beardmore Electric Service, 22-28, Queen's Road, Bayswater, W.2.

Victorella. No. 502,631. Class 8. Wireless-telephonic apparatus and parts thereof, &c.—J. J. Vickers & Sons, Ltd., 80, Royal Hill, Greenwich, S.E.10.

Volustat. No. 502,709. Class 8. Electrical resistances.—Harlie Bros., 3, Balham Road, Lower Edmonton, N.9.

Visor. No. 500,151. Class 13. Lampholders and clamping rings.—The Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.

Neron-Vitalux. No. 501,749. Class 13. Electric lamp.—Die Osram Gesellschaft, 11-14, Ehrenbergstrasse, Berlin, O.17, Germany. (Cruickshank & Fairweather, 65-66, Chancery Lane, W.C.2.)

Chemical Engineering.

In his recent presidential address to the Institute of Chemical Engineers, Sir Alexander Gibb discussed the economics and present position of those chemical industries in which electric power plays so large a part that its cost is a decisive factor.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

BARKING.—Cellulose factory, Hertford Road; Dryster, Ltd.

BARNET.—Operating theatre, Wellhouse Hospital (£8,000), for the B.G.; clerk.

BARNSLEY.—School (300 places), Ardsley, for the R.C. managers; priest-in-charge.

BERKHAMSTED.—Re-erection of works, for Kepstone, Ltd.; B. Greene, managing director.

BEXHILL.—Houses, Westville Road and De La Warr Road; J. E. Maynard, Collington Avenue.

BIDEFORD.—Public hall (£7,000); P. J. V. Fulford, secretary.

BLACKBURN.—Re-erection of portion of Feniscowles Paper Mills, for the Star Paper Mill Co., Ltd. (£80,000 to £100,000).

BLACON.—Church, with electric light work; Humphreys, Ltd., builders, Knightsbridge, London.

BOGNOR.—Hospital (£30,000), for the War Memorial Hospital Committee; secretary.

BOLTON.—Church, Chaddock Lane, Boothstown, for Very Rev. Dean Whiteside; Messrs. G. & S. Seddon, Ltd., contractors, Manchester Road, Little Hulton, near Bolton. Extensions, Alma Mill, Prescot Street; Bolton Manufacturing Co., Ltd.

BRADENHAM (HIGH WYCOMBE).—School for Bucks. E.C.; director of education, Aylesbury.

BRENTWOOD.—Church, Hutton; Rev. P. L. Claughton, rector.

BURNLEY.—Operating block at Primrose Bank Infirmary, for Board of Guardians (£5,750); Messrs. Hitchen & Pickup, architects, 46, Manchester Road.

BURSLEM.—Adapting old Town Hall for offices; Stoke city engineer.

CAMBERLEY.—Secondary school for Surrey E.C. (£33,382); county architect.

CARSHALTON.—Central school; Surrey E.C.

CATERHAM.—Central school, Caterham Hill; Surrey E.C.

CLOWNE.—Mining centre, for Derbyshire E.C.; G. H. Widdows, architect, St. Mary's Gate, Derby (returnable deposit of £1 1s.).

COCKERMOUTH.—Conversion of Dovenby Hall into mental home, with extensions (£31,000), for Cumberland and Westmorland County Councils' Joint Committee; clerk, Carlisle.

COVENTRY.—School, Tile Hill Lane, for the Borough E.C.; Oldham & Dale, architects.

CROYDON.—Church and school, Downsview Road; H. Kelsall Armitage. Factory, offices, &c., Purley Way; British Metallic Co., Ltd.

DALSTON.—Shops at Dalston Junction Station; L.M.S. Railway Co., Ltd.

DARLINGTON.—Additional 50 houses for the T.C.; borough surveyor.

DARWEN.—Re-erection of works for Shaws Glazed Brick Co., Ltd. (£60,000).

DEVON.—Schools, Chagford, Chulmleigh, Hatherleigh, Ilfracombe, Kingsbridge, Moretonhampstead, North Tawton, and Plympton St. Mary, for the E.C.; director of education, Exeter.

EPSOM.—Housing scheme (34), Ashtead, for the R.D.C.; F. A. Pratley, surveyor, Ashley House.

FALKIRK.—Reconstruction of head office for Falkirk and Counties Savings Bank; J. G. Callander, architect, 1, Newmarket Street.

GLASGOW.—Housing scheme (40 acres) at Carntyne. 200 houses at Knightswood; director of housing. Elementary school, Elmvale Road; Education Committee. Church at Knightswood (£15,000); clerk, Dumbarton Presbytery. Additions, Royal Cancer Hospital; the medical superintendent. Factory at Lilburn Road, for Cooper, McDougall & Robertson, Kelvindale Works; the manager. Showrooms and works at 28 to 36, Renfield Street, for James Woodhouse & Sons; the manager. Extension scheme for Barclay, Curle & Co., Ltd., Whiteinch; the manager.

GUILDFORD.—Fire station, Nightingale Road; borough engineer. Store, Friary Street; Fogwills, Ltd. Extensions, stores, Woodbridge Hill, and warehouse, North Place; Industrial Co-operative Society, Ltd.

HARROW.—106 houses, Park Lane and Woodberry Avenue; Wall & Rolnick.

HEMEL HEMPSTEAD.—Secondary school (£40,000), for Herts. E.C.; county architect, Hatfield.

HIGH WYCOMBE.—Extensions, Royal Grammar School (£6,450), for Bucks. E.C.; W. S. Try, builder, Cowley, Uxbridge.

HORWICH.—Council school; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

HUDDERSFIELD.—Housing scheme (35), Newsome, for the T.C.; borough architect, 26, Ramsden Street.

HULL.—148 houses for Corporation; H. M. Nowell, Ltd., Bank Chambers, Stockton-on-Tees.

IRISH FREE STATE (ATHLONE, Co. MEATH).—Church; Jones and Kelly, architects, 17, South Frederick Street, Dublin (returnable deposit of £10 10s.).

KESWICK.—Re-erection of wing, Royal Oak Hotel; P. M. Hope, architect.

KEYNSHAM.—School for Somerset E.C.; director of education, Weston-super-Mare.

LEEDS.—Hotel, Regent Street; Garside & Pennington, architects, Ropergate, Pontefract (returnable deposit of £2 2s.).

LONDON (ILFORD, E.).—56 houses, New North Road; A. J. Jennings.

(WEST HAM, E.).—School (£45,000), for the Borough E.C.; J. Jacques, architect.

(WALTHAMSTOW, E.).—Re-erection of works, for the Duro Glass Manufacturing Co. (£20,000).

(ISLINGTON, N.).—Housing scheme, Waltersville Estate; E. C. P. Monson, architect.

(WIMBLEDON, S.W.).—Factory extensions, Riverside Road; Jas. Burges & Sons, Ltd.

(SOUTHFIELDS, S.W.).—73 houses, Skeena Hill; H. S. Keens. Works for Aluminium Plant Vessel Co., Ltd., Point Pleasant; G. Parker & Son, Ltd.

(FULHAM, S.W.).—112 flats, North End Road; C. & E. Joseph.

(PUTNEY, S.W.).—Motor showroom for 50 cars; Messrs. T. H. Adamson & Son, High Street.

(WANDSWORTH, S.W.).—Municipal Buildings; E. Hunt, architect.

MATLOCK.—Re-erection of Cromford Mills, for the Cromford Colour Co., Ltd.; H. Key, chairman.

PENZANCE.—Housing schemes, Park Wartha Estate and Penalverne Estate; borough engineer.

PINNER.—School (400 places); Middlesex Education Committee.

PORTLAND.—Housing scheme, Easton Lane; Smith and Lander.

PRESTON.—Church (£10,000) and school (£6,000) at Fishwick, for Catholic Authorities; Messrs. Mercer & Duckworth, architects, Dock Chambers, Fleetwood.

RIPON.—Housing scheme, Aismundary Estate (£16,000); electricity showrooms, for the T.C.; city engineer.

SALFORD.—Extensions, municipal buildings, for the T.C.; Col. Martin, city engineer. Infirmary extensions for the B.G.; W. T. Gunson & Son, architects, 10, Marsden Street, Manchester (returnable deposit of £2 2s.).

SELBY (YORKS.).—Installation of electric lighting at Selby Abbey; C. M. Oldrid Scott, architect, 2, Dean's Yard, Westminster, S.W.1.

SLOUGH.—Grammar school and extensions to Montem School, for Bucks. E.C.; county architect, Aylesbury.

SMETHWICK.—Central clinic (£13,334), and school, Uplands, for the Borough E.C.; director of education.

STAVELEY.—Grammar school, for Derbyshire E.C.; G. H. Widdows, architect, St. Mary's Gate, Derby (returnable deposit of £1 1s.).

STOKE-ON-TRENT.—Housing scheme, Carmountside Estate; city engineer.

SWINTON AND PENDLEBURY.—Housing scheme (102), for the U.D.C.; H. Entwisle, surveyor (returnable deposit of £3 3s.).

THORNTON HEATH.—Shops and showrooms, Bristock and London Roads; F. L. Pools.

TUNBRIDGE WELLS.—Development of Nevill Court Estate; Bracket & Sons.

WALLASEY.—Public wash-house and baths, Oakdale Road, Seacombe (deposit £1 1s.); borough engineer, Town Hall.

WEMBLEY.—Estate development, Harrow Road; Comben and Wakeling.

WILLINGTON (Co. DURHAM).—Business stores, with electrical and central heating work, for Crook Co-operative Society; secretary.

WOLVERHAMPTON.—Theatre scheme, for Leon Salberg, Alexandra Theatre, Birmingham.